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NOTES ON A JOURNEY TO SOME OF THE SOUTH-WESTERN PROVINCES OF SIAM.*

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The journey on which these notes were made was undertaken for the Siamese Government, for the purpose of visiting and reporting on the newly opened tin deposits in Ratburi, the tin-mines of Puket and other provinces on the west coast, and surveying certain mining areas, while at the same time I was to obtain what information I could at Mergui on the question of the best manner of encouraging and controlling pearl fisheries.

Thus, our course being first west to Ratburi, and the mines being close to the frontier, I decided to go over by the Tenasserim river to Mergui, and thence by sea to Puket for our southern work, returning by way of Renong and Kra to Chumpon.

The party consisted of my three Siamese assistants, cook, and extra hands—eleven all told, plus my Shan dog Rover. "Master Cheerful," as his name translates, he of the love-songs of our Luang Prabang trip, was again one of us, with several other old hands. One, "Master Star," was said to be very musical, and capable of incredible tremolos on a high note, and so of course a great addition to the party.

I. Bangkok to Tavoy.

We started westward bound from Bangkok on a misty February morning, in a 35-feet chow-boat of 7-feet beam and 14-inches draft, the flood tide taking us into the great main waterway connecting the Meinam and Tachin rivers.

* Paper read at the Royal Geographical Society, January 28, 1895. Map, p. 496.

All the morning markets were busy, the hundreds of small canoes, laden with the products of the country round, moving slowly in and out with never a collision or a row; the air laden with the hum of talk, each one bargaining, gossiping, and chaffing as she got the opportunity. Very few men are to be seen among these market folks, unless a few Chinamen. The Siamese, if he wants a good bargain driven, always calls his wife or daughter, and in business matters he is generally ruled by them. Thus in Siam, where the differences of rank are so marked, the "equality of the sexes" is almost a reality, and the women may be said to be the rulers as well as the workers.

In a few hours we were in the silence of the great plain, which lay napping under the burning sun, to awake in the cool breezy evening into a low murmur of life.

Stand upon the top of the high palm-fringed bank of one of these great cross-country waterways, and in the gentle evening light look round over the now yellow paddy country stretching far to the horizon: or to some straight, high bank of green marking another dyke, where the tall brown lug-sails are creeping slowly against the sky; or to the east to the far line of trees on the Meinam banks. If ever you have been below Baitsbite lock or to Denver sluice, you will feel the same charm now upon you as you did in those early boating days in the broad fenland.

The paddy land often gives place to neat Chinese gardens of banana, sugar-cane, betel, and pepper, planted in long parallel lines between their irrigation ditches, or to wide stretches of low swamp undrained, and unclaimed except by the buffalo and the heron—great lakes of water where—

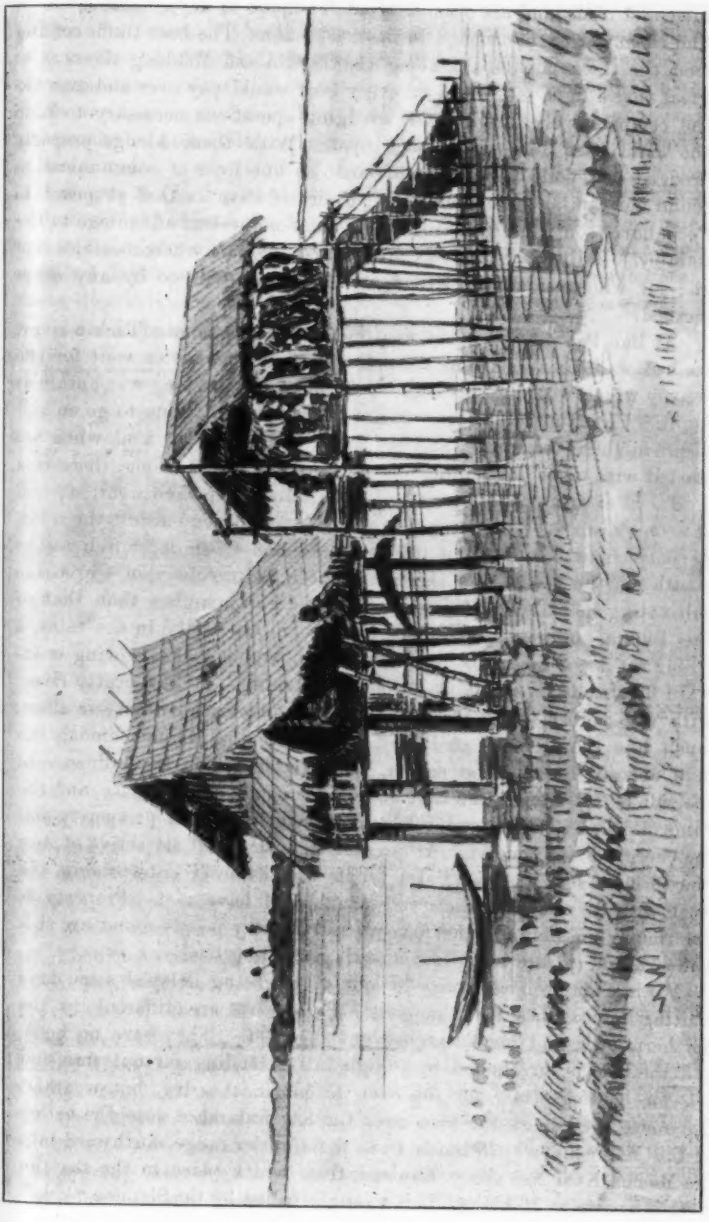
"The long ripple washing in the reeds,"

the sigh of the south-westerly wind, and the chirp of the crickets, are all you hear for hours at a time.

Near their cultivation are the villages, usually along the high banks of a klong (or canal), looking, many of them, far from prosperous, and in September and October, when the floods are out, these are the only things above the great surrounding waste of water. Those who own ponies drive them up into a stable on 8-feet piles, where they wait till the water goes down; and even the buffaloes get more bathing than they want.

In one tide a boat usually reaches the Tachin river, one of the mouths of the Meinam, by using the flood to the point where the tides meet, and then going on with the ebb. Siamese will readily "chow" twenty-four hours at a time if put to it, with only a stop or two for a bathe in the heat of the day, and time to eat their rice.

These water highways, the only means of communication Siam has got, and representing an enormous expenditure of well-spent time and money, are many of them being allowed to silt up. The consequence is, that for many miles boats have very heavy work getting through the



IN THE RAINS.

mud and reeds, and are often delayed for hours or days, while launches find them impassable, except in the flood season. The boat traffic coming from the thick populations along the Tachin and Meklong rivers is so great that a light toll levied on every boat would pay over and over for the comparatively unimportant dredging operations necessary to keep the main east and west klongs open. With these klongs properly dredged and policed, Siam could boast as fine lines of communication round her capital as Holland itself; such railways as that proposed to Pechaburi (south of Ratburi) would be of no present advantage to the country. Railways and roads are wanted in Siam where boats cannot go; for wherever a boat will float, no Siamese will go by any other method.

At Ban Pak Char, a dirty unattractive village on the Tachin river, we had an intimation from the police that we had better wait for the convoy which would go through on the flood, as the klong was unsafe at night. Unfortunately there was not water enough for us to go on and disprove these calumnies, and we had to wait until 3 a.m., when we started with some forty other craft. Nearing the Meklong, there is a good deal of attap, mango, coconut, sugar, and pepper cultivation; and at noon, passing through very tidy villages, we opened out into the river. A conspicuous landmark is the great Roman Catholic church at the mouth of the klong, and there is quite a large colony of Christians cultivating here. The river-bed is considerably higher than that of the Tachin, and the consequence is there is, especially in the rains, a strong set down the canal into the Tachin, which makes towing westward by steam-launches a profitable undertaking. It is a pretty river, with tall timber on its banks, clear water, and sand bottom; in short, much like the Meinam at Pichit, and unlike the Meinam among the mud deposits of its lower course. Ratburi, to which the influence of the tide is felt, was, in the time of the old regent, a busy place, and the ruins of palaces, villas, and roads witness to its former prosperity and the energy of the regent. At present it is the least attractive of any place I have seen in Siam. Its people are the least enterprising, the least cleanly, and the least well-mannered I have met. Property is notoriously unsafe; and the farmers and country people round are sick at heart, and (a rare thing in Siamese) grumbling loudly.

We had ample opportunity to look about, being delayed some days waiting for ox-carts for transport. These carts are different to the northern ones, and more roughly put together. They have no hood, and the floor is surrounded by a high rail extending far out fore and aft, for holding straw for the oxen to eat in the dry, hot weather. Our route lay almost due west over the low watershed into the valley of the Meprachi, which drains from the frontier range northward into the Menam Kuai Noi above Kanburi, from which place to the sea the river is known as Meklong. It is a jungle, called by the Siamese "kok,"

of small timber of hard woods all the way. In the dry season the grass is burnt up, there is hardly any water, and jungle fires light you at night. They look, with their long rows of flaming tongues seen through the tree-stems, curiously like coke-ovens in the black country. On the north we left some abrupt limestone outliers, from which abundance of lime is burnt in kilns by the river-side. Behind us lay the paddy country and a few villages of Lao people. At night we lay awake listening to the thump of their rice-mills, and—loveliest thing in Siam on a moonlight night—the distant notes of the kan (or khen), reminding us vividly of our old northern camps. But by day, alas! we saw these so-called Lao drunken and noisy, clothed with old European hats and coats, like veritable savages on the verge of the evils of civilization, a pitiable and degenerate relic of the Wiengchan captives.

RATBURI, FROM THE RIVER.

Ere reaching the Meprachi we camped three nights at Ban Nong Sado, Nong Maho, and Utapao, the latter merely small clearings in the jungle. The distance is generally done in two nights. We met a few waggons going down laden with mai rang, a hard wood used for boat-ribs, door-posts, etc. Two can be cut and shaped in a day. The best of the sleepers for the Korat railway are being cut in this and the neighbouring province of Kanburi. The drivers were all in great fear of cattle-lifters, who seem to do an extensive trade between the three provinces of Kanburi, Ratburi, and Pechaburi. At night they invariably place the cattle inside a laager of waggons, and sleep inside, with arms loaded when they have them. The Meprachi runs between high banks clothed with ton takien and ton yang (of the Dipterocarpus family). All the latter within reach of any village are defaced by the pockets cut in the trunk for the accumulation of the dammar oil. We met several gangs going their rounds of the trees, some carrying old kerosene-tins full of the oil, the others ladling it out of the tree pockets. Ere going

on, they thrust in a bit of a burning branch to stimulate the flow of oil. They are magnificentiy proportioned trees, and we passed many of them without a branch for 100 feet, standing gaunt and dead, the result of the process.

We camped a fourth night at Tung Mai Deng, as we arrived too late to reach Prachadee, the head-quarters of the mining. There are a few scattered Karen villages, such as Ban Mai and Suanpung, along the Meprachi, but the largest Karen population is further north. They reminded us very much of some of the Khache (or Kacha) tribes of the Lao states, with their beads, earrings and necklaces, and their gay trimmings. They tie up their long hair, in a red or white turban, into a long kind of horn. It is often a foot or more in length, and generally leans forward. The horn worn by some of the Khache is generally shorter and on one side. It is very like the adornment mentioned by Mr. Baber as the fashion among the Lollos. They cultivate bananas, pineapples, and rice upon their "rai" hill clearings, the clearing and burning for which is done in February and the following months. That is about all the work they ever do, except now and then when they shift their homes, or carry a load upon their backs over to the Tenasserim river. The harness for holding their packs is often very neatly strung together, and consists chiefly of two bent pieces of a hard jungle wood to hook over the shoulders, and a band for the forehead. Beyond a few villages of these people, a Lao or two, and an occasional Siamese who has reasons for avoiding the towns, the country is quite uninhabited. The power they most dread in this world is the temper of a certain Lao damsel well known all over the countryside as Isom. We met her several times, and always the sound of her voice preceded her through the trees, abusing some unhappy forester. In all jungle arts she was an adept; she could put to the rout our readiest wits, even Master Star himself, and she spared none. She had evidently advanced ideas about her sex, and from her, after she had made careful inquiries of my followers as to my character and position, I had my first offer of marriage one day as our party rested in the shade. She became extremely inquisitive to know to what I objected in her, and when I told her primarily, like most of her sex, her tongue was too powerful, she got up and went off for a day's fishing, and the laugh turned against her. Thus fortunately ended my first love-affair.

Prachadi is merely a little clearing on an open space among the hills, where the valley of Hoay Baw widens out. As its name implies, a small pagoda or two once stood there, of which some piles of stone yet remain—no doubt erected by some poor fellow who, coming out of the dense jungles all round, was overjoyed to see a bit of sky overhead and an open space of ground beneath his feet, and made his vows and built his offering on the spot. Above this begins the alluvial tin deposit, which is also found in all the parallel valleys on the south. The slate

rocks which one stumbles on in the stream-beds becomes much altered toward the junction with the granite of the main axial range, to which the tin owes its origin. In places the granite veins may be seen piercing the older rock, but it is very difficult to find a well-exposed section. The tin of the valleys occurs in a blue clay which lies on the clay-slate bed, and is very like some of the karang of Puket. It is full of pebbles and large water-worn boulders of granite, in which may be seen a beautiful variety of combination of the constituent minerals. The karang where proved has been found 4 to 8 feet thick, and gives as good returns as the best of the Puket stuff.

The tin is plentiful, except in places which appear to have been worked over formerly; it is very black and of good quality, and the overburden seldom exceeds 5 feet in thickness—a depth which would delight the souls of Puket miners, who often have to strip 20 and 30 feet. A little gold occurs in some localities with the tin. So far but few men have been employed, and the output has been small. It is hoped that next year a large number of men may be got to work on the "tribute" system. The heaviest expense in working these valleys will be the clearing of the very heavy timber which covers them, and the transport to Ratburi, which is 44 miles off. The road, it is true, is not difficult, except the 7 miles from Prachadi down the course of the Hoay Baw, which is rough for carts and oxen.

The parallel valleys to the southward are hard to get at, but a cart trail could be cut through from Prachadi some 6 miles to the Nam Ron and Hoay Baw Krung, which would not meet with very rough country. At present there are no tracks in that direction but those made by wild elephants, which are very intricate. The men have a wholesome dread of tiger up here, and on the march never think of mentioning the animal by his proper name. It is always "that fellow," "it," or "he," for fear he should be listening. The barking deer (called by the Siamese ikeng), samba (kwang), and gibbons, and jungle, and pea-fowl abound.

It was in March that we pushed on westward with a number of Karen porters, and began ascending to Kao Deng, the frontier ridge, over which every evening massed vast cloud-castles, flashing and growling like heavy artillery. The trail we followed is very rough, and rarely used but by the Karens, or an occasional Burman returning home from the Chantabun gem diggings. They mostly, however, go over further north, either by the Amla route or by the Bongté pass, where the Tavoy Bangkok telegraph line crosses the frontier. The Amla route is much less used than formerly, and is in parts almost impassable. The last-mentioned, on the other hand, offers the advantage of the magnificent road which connects Tavoy with the boundary, and follows the telegraph clearing to that point. On the Siamese side, there is not much to choose between either route.

As we were all well laden, we took two days and a half to reach the

river, going, as the plan shows, considerably north up Hoay Wai Noi, until we got into steep valleys, in one of which we cleared a space and camped in profound darkness, with glimpses of sunlight on branches and trees 300 feet above us. There was very little water in the stream, but next day, going up the valley, we suddenly found ourselves climbing on a beautiful crystalline limestone, with a good stream of water splashing down. Granite pebbles were wedged in here and there, and a granitic sand lay in some of the pools. Turning westward, we were on the well-defined frontier ridge at noon, having passed some old workings, which the Karens averred were long, long ago worked for tin —a remarkable thing, if true, in such a terribly inaccessible spot. There were no outcrops to be seen, and we trod over the thick deposit of decaying vegetable matter, which in these forests so hinders the geologist. On the British side, the descent is rather abrupt for several hundred feet, and the easiest way down was, following the practice of the gibbons, to trust principally to one's arms and such branches as came handy. From the number of smashes, it was obvious that for such methods of travel monkey is much in advance of man.

We camped at Ban Tamamuang, a Karen village of four huts in a rai clearing. We had been credibly informed on the other side that it was a large and flourishing settlement, where we could provision ourselves with fowls, etc., for a week. We saw five, which we were told we might shoot (the only way of getting them) for an exorbitant quantity of small change. All the Siamese or British small change the Karen can get goes to his personal adornment, and strung on his neck or round his arm you see the whole of his available capital displayed. From Ban Tamamuang the trail goes along the top of an abrupt east and west ridge, with deep valleys on either side, and similar parallel spurs beyond them, the whole country a wild jumble of wooded hills and deep valleys, still dark and shrouded in the blue morning mists. A steep drop at the end of the ridge landed us on big granite boulders in the bed of Hoay Matang, and some hours down we were on the old clay slate again, with very fair-looking tin gravel in the bed of the stream, which showed up well in washing. All the way we met the charred remains of old Karen houses, and saw the "rai" clearings on the south slopes of the hills—long ago exchanged by the unsettled roving spirits for some new abode.

We forded the Tenasserim river, or Menam Amla, as the Siamese call it, thigh-deep opposite Ban Kiu. Once again the wild yarns we had heard on the other side, of populous villages, fleets of boats, and the like, were rapidly dispelled. We found ourselves threatened with a permanent residence at Ban Kiu on starvation diet. There were three households with about twenty inhabitants, and one fowl, half a buffalo, and two dogs per head, both the latter being our inveterate enemies. There was one boat for the whole population, and there was

no way through the jungle to get on by. The want of boats is, say the Karens, one result of the tax for felling certain timbers (especially the mai takien) imposed by the Forest Department, which makes it scarcely worth while to cut down one of these huge trees, which may after all have flaws in it making it unsuitable for a boat. To make a long story short, I took the one boat; with a Karen at each end as crew, and with Yen the Contemplative as cook and first lieutenant, I left Master Cheerful in charge, and went three days up river to gather boats for the party.

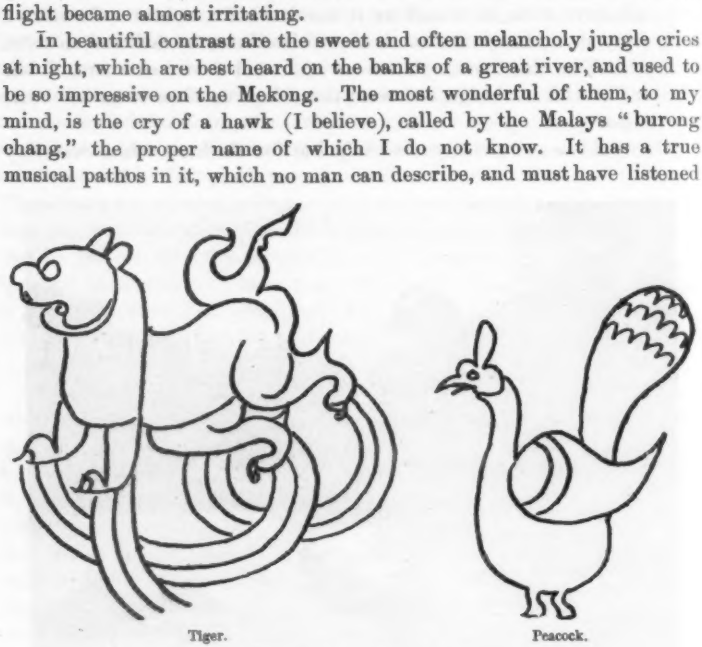
It would have been a perfect trip but for the heat, which was very

OUR BOATS ON THE TENASSERIM RIVER.

great. The wildness of the river exceeds even that of the Nam Oo, of which it reminded us; but the quantity of water is much less, and at that time of year it was hard work dragging the boat over the shallow shingle rapids. Game is plentiful, and without going out of our way we saw seven samba, and secured two, which were cut into steaks and smoked over the fires all night, and thus lasted us for weeks. Wild buffalo, the animal the Karen most dreads meeting, is fairly common, to judge by his tracks. We saw rhinoceros, boar, and tiger tracks, and we often heard several barking deer at once. Jungle fowl, peacocks in pairs and flocks, the great cormorant, always fishing solitary, "nok poot," and the great egret and other herons, we constantly came upon as we rounded a baking ledge of rock or a blistering sandbank,

and now and then a merry colony of otters at sunset. But what astonished us most was the number of the great hornbills. In one flock, as they flapped their slow way to roost, I counted fifty-six, and in another twenty-five. They were so common that their dismal croak and noisy flight became almost irritating.

In beautiful contrast are the sweet and often melancholy jungle cries at night, which are best heard on the banks of a great river, and used to be so impressive on the Mekong. The most wonderful of them, to my mind, is the cry of a hawk (I believe), called by the Malays "burong chang," the proper name of which I do not know. It has a true musical pathos in it, which no man can describe, and must have listened



Tiger. Peacock.

TATTOO DESIGNS DRAWN BY A KAREN.

to lying awake alone upon the sands to understand. Below Amla we journeyed through a sheet of granite country, and above into red sandstone rocks, dipping to the south-east, and passing into a rough conglomerate further north. All these slates, grits, conglomerates, and sandstones upon the edges of the granite are, however, much distorted, and their succession is very difficult to follow.

The scenery from the boat is beautiful, the hills rising abruptly out of the deep still reaches in many places to a height of 1000 feet, covered with fine timber. In these reaches we paddled along the edges, now and then getting a shot at a jungle fowl. Our bow man whipped the surface with a bamboo rod and a green leaf on his hook in a most scientific manner; indeed, he threw very well, over and over again placing his leaf right over the nose of a big fish, with the result of a splendid struggle. The largest we got was a pla lon, as the Siamese call it, 3 feet 6 inches long from nose to tail; but he was shot as he lay below a rapid. After

three days' balancing in our narrow round-bottomed dug-out, more difficult to sit in than the crankiest funny ever seen on the Cam, we passed a small Siamese settlement, and reached Lak Chan Puek, a small village on the great frontier road, consisting of four or five households. From here I sent away enough boats to bring up our party, and spent a week in tramping the country round for game and in cultivating the society of the place. Yan Kung, a tall Burman, was popularly regarded as the chief person, but in all matters of state he was entirely ruled by his wife, who was a Siamese, and possessed in full that capacity for talking which has made her countrywomen such a power in their own land. But she had, too, their kind heart, and could never make enough of us. She had a certain knowledge of the Farang and his ways, which prompted her to bring a pan of warm milk to the sala every morning, a proceeding which raised her much in my esteem. Another important character was Sân, a Mon (or Peguan), whose calling in life was to make the silver chains and bracelets in which fond Karen mothers deck their infants to keep out uncanny spirits. His wife was a burly body of

PLA LON.

unusual activity, who pounded the rice, beat the dogs, and smacked the children (a fine family of all ages up to nineteen) from before sunrise to after sunset.

The number of children in the place was tremendous, but I soon found they were mostly the survivors of families who had come over from Siam. Their mothers and fathers long since dead of fever, which seems to be very fatal to them when they settle in a new place, they themselves had been adopted into families which could find food and use for them. One typical story was that told me by a small Siamese known as Toto, who came over with his father, mother, and small brother three years ago. The two former died within a month, and the small brother, when out a few months ago, was bitten by a snake. They generally talk so unconcernedly of death, that we were surprised to see Toto begin to blubber at this point, and all the other small boys joined out of sympathy. "He was two soks high, and I loved him very much," he sniffed, as he climbed hastily out down the ladder. The body-guard, as we called the crowd of twelve-year-old creatures that invariably accompanied him, followed too, also out of sympathy. Each one of these veterans possesses, as his stand of arms, a heavy jungle knife, of which he is intensely proud; and each has his daily work cut out for him—to guard the oxen as they feed in the jungle, to help the women drying

tobacco, or, if he be older, to help clearing rai or go fishing-expeditions. Not a few had their tiger yarns to spin, and they did it eloquently, too, in brief expressive sentences, and with the gesticulation of which even children among the Siamese are often masters.

Yen, who is a good sportsman when sailing or shooting rapids, or in other pursuits which appertain not to killing live creatures, for which he is too good and gentle a Buddhist, used to get some of these blood-thirsty huntsmen to do the killing necessary for our chicken curry. Besides being executioners, they constituted themselves our guards at night and our shikaris by day; and altogether we have little cause to forget that hospitable little jungle colony. What struck one was the total absence of malice among themselves, with the result that one never heard any scandal or gossip. The conversation chiefly ran on the last fishing journey, the character of the year's rice, the quality of somebody's oxen, old dacoit yarns (many of them gruesome enough), experiences of travel down to Tavoy or the Malay peninsula, and reminiscences of Englishmen and their guns. The last invariably brought on a discussion as to why Government won't allow them firearms, for which they have a keen appreciation. They usually manage to get at the bright side of things, and so it would end with the verdict, "It is better to have no guns and no robbers, than having our guns to be in perpetual fear of our lives and property." Still, the boldness of tigers and leopards round these forest settlements, which bears hard on them in loss of cattle, etc., is owing to the impossibility of hunting them down sufficiently with no arms but jungle knives.

The Karens about the frontier-line all talk Siamese and Burmese as well as Karen; they are constantly moving from one side to the other, but there are far larger numbers settled in the Tenasserim valley than on the Siamese side. Timidity of strangers and love of loneliness seem to be their chief characteristics; they prefer to build their hut and cut their rai a day's march from their neighbour, if they can, to being among a cluster of houses. They say, "We do not like to see many houses. Had we to live in a town, our hearts would be heavy; we should die." And thus year after year the family goes clearing its way further into the wilderness, paying extraordinary reverence to the sights and sounds they meet, each one of which to them portends some degree of luck or the contrary.

When the boats came up, we started on our march down to Tavoy, our gear and invalids (we had generally two or so down with fever) going in the boats on the river below. I found it impossible to go down river to Tenasserim as I had wished, as the Karens absolutely refused to go, and seemed to have a great terror of the lower river; so there was nothing for it but to go up, by Myitta and Tavoy. And a most luxurious march it proved, notwithstanding the heat, with all the beauties of mountainous jungle country and none of its draw-

backs. A fine road to go upon, following easy gradients, showing us wonderful scenes (which one generally has to do without in these forests), and we had the assurance of a roof overhead and a floor underfoot at the end of the day. In fact, we were all much impressed with

the comforts of travel in British territory, with comfortable Public-Works-Department bungalows or shady salas every 5 or 6 miles.

Our morning marches, when the wet mists lay thick about us, were enlivened by rather clever extemporary "clown scenes"—such as they act in Siam—between Master Cheerful and Master Star. Question

follows question, and the fellow acting jester has to reply as wittily as he can right off without hesitation. The style is rather that of the circus at home, when the horse-trainer asks conundrums of the clown, only the Siamese is all extemporary. Master Cheerful is a genius at this form of amusement, as he is at others, and on these occasions he thoroughly bore out his name, and kept the hillsides echoing with laughter.

The first day we went 20 miles, and got some wild honey for supper, the Karens cooking the comb; bees are, in fact, over-plentiful and over-familiar, alighting all over one. The scenery is quite imposing; the hills above point after point are generally thickly timbered, but stand in places bare fire-swept peaks. We reached Boa Chon in two days more. We found here a plum-tree, the fruit of which stewed down is very like damson. We had a serious alarm that night, in the middle of a lesson in Burmese. In rushed the Karens with frightened looks and the horrifying intelligence that the moon was being eaten. Every one, with great presence of mind, rushed to the nearest pan he could lay hands on, and began to beat and thrash it heroically; the result became a frightful din that awakened all the jungle fowl for miles around, and they joined the chorus. Still the moon undoubtedly got smaller and smaller. As a last resource, the head Karen begged me for a rifle, and commenced "independent firing at 220,346,080 yards" (or thereabouts), with such satisfactory results that (although I had hardly expected the weapon would carry so far) the dragon was compelled to retire, and the fame of my rifle spread in the land. I regret to add that Master Cheerful alone declared it was no dragon, and that my rifle had nothing to do with the result. The intelligent reader will understand from all this that we observed a partial eclipse of the moon on March 21, 1894.

At Myitta, which we reached next day, we found ourselves among a comparatively thick and thriving population of Karen Christians, owning elephants, schools, and chapels. We heard them singing hymns a good deal, but I was told of them that the better Christians were the best idlers. We soon found, however, that there were ideas of discipline among them, for, though we arrived late in the afternoon, we had ten elephants ready loaded by 4 a.m. next morning. We did 27 miles that day, downhill most of the time to Pagaye, very few feet above sea-level, and only 11 miles from Tavoy, which we reached next morning across the thirsty plain.

Though in well-known country, I cannot but refer to the last two days' march, leaving Nwalabo and its ranges towering in mists above us, and descending from the heavy timbered forests to the more gnarled and twisted woods on the last granite spur at Wah Gon, and finally to paddy and palm growing zone about Tavoy. We met a large number of Siamese-speaking Burmans, Tailings (or Mons), and Karens, most of them having been into Siam at some time or other on some trading

venture—to sell iron files and knives, to buy elephants at Singora, or dig gems at Chantabun—and they were most hospitable fellows, getting us in for a chat whenever they could. The Siamese were much

THE TENASSERIM RIVER ON THE FRONTIER ROAD.

impressed with the size and power of the humped oxen; and the carts of the flat country fairly astonished us all, for we had never in Siam dreamt of carts of such carrying capacity—for the simple reason that there are no roads for them to go upon.

Our lowest and highest readings of the thermometer were at Prachadi, on the same day early in March, where we had 55° Fahr. at sunrise, and 97° in the shade at 2 p.m. The average temperature in the mornings there was 61°, and the average maximum 90°. A month earlier it would have been much colder. The cooler the morning, the higher the reading later in the day in the winter months. The middle of March gets warmer, and the temperature at night is seldom below 70° in the hills, and 80° in the lowlands. Toward the end of that month the warmth is often tempered by tremendous thunderstorms, and in one hour the thermometer will fall 20°, and the damp air, suddenly cooled to 73°, feels very chilly. One such storm at Lak Chan Puek began with a tremendous shower of big hailstones, the thermometer at 93° Fahr. The contemplative Yen appeared completely fascinated, and after studying and (like a truly scientific investigator) tasting and finally eating the phenomenon for some time in silence, he commenced a close examination of the subject of meteorology, with the results of which he occasionally startles me to this day. The only thing which drove the hailstones out of his head was our arrival in Tavoy, from which place his parents originally came, and the language of which he knew as well as his adopted tongue of Siam.

From Captain Cronin, the deputy commissioner here, and from Mr. Batten subsequently at Mergui, I received the greatest kindness and hospitality, as well as much interesting information. I know few things in life that give greater pleasure than the hearty welcome and the refreshing conversation with which Englishmen, thus stationed on the outposts of civilization, greet you, when you march in upon them unexpectedly straight from the deep-jungle life.

II. Tenasserim and Trade Routes.

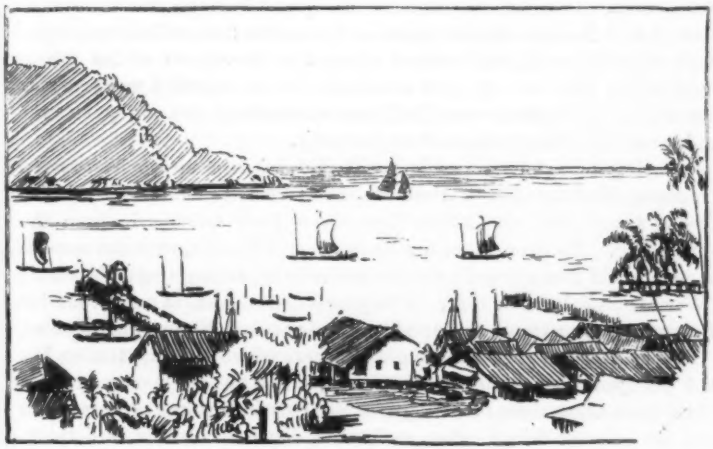
From Tavoy we reached Mergui * by the B.I. ss. *Camilla*. It is one of the prettiest of little seaside towns, the thatched roofs climbing the hill to the pagoda at the summit amid a luxuriance of vegetation, which showed plainly that we were now in Malaya, in strong contrast to the more truly Burmese scenery of Tavoy. The flora and fauna of Mergui partake of those of both; it forms a neutral zone where both flourish; but its Malay character is perhaps the more pronounced, and the flowering trees and shrubs, and the mango, mangostine, coconut, pine-apple, jack-fruit, and durian thrive as they only know how in Malaya.

The province has a few very self-contained Malay villages, Karens, Siamese, Burmans, and last, but more energetic than all the others put together, Chinese. As elsewhere, the Chinamen, with a few natives of India, do the trade, and cause the trouble. It is essentially not a rice-growing province, but exports, as might be expected, large quantities

* Siamese name, Muang Melit.

of fish and fruit, dammar torches, dried shark-skins, and edible birds'-nests—the latter chiefly from the Canister and St. Andrew's groups; they go to the straits, and they go into the Shân states usually by the Yunnanese caravans from Mulmen. They invariably come from the isolated limestones of Lower Carboniferous age, of which the extensive remains form so peculiar a feature of the scenery of both sides of the peninsula, as far north as Moulmen, and apparently as far south as Perak, which appear in the Lao states upon the Mekong, on the Nam Oo, and even in Tongking and Yunnan.

One of the most striking peculiarities of Mergui are its boats, which differ completely from either Chinese or Siamese design. The form of hull is best described by a sketch. The rudder, which is hoisted as she



MERGUI BAY, FROM THE HILL.

lies on the mud, is lowered when under way until it draws 3 to 4 feet of water. The boat is long and narrow, with a V-like section, built upwards from the lower solid floor by strakes fitted inside one another, a riband being run round outside the joints. They are rigged with two slender pole masts, one right in the eyes with a slight rake forward, and one amidships, and they set two light square-headed lugs as near as possible the same size. They are generally indifferently ballasted and caulked, and, having very little initial stability, they are sailed as upright as possible, a moderate list proving dangerous, as I found once in a squall, when with a very moderate heel we found ourselves taking in water so fast that we had to strike all sail. There is usually a small shelter abaft the mainmast; but otherwise there is hardly a dry place, as the deck is not made to keep out water.

The fishing craft are generally lighter and narrower still, being simply dug-outs without additional structure. They have no shelter, but a thatch to place on the nets before the mainmast. They are quite round-bottomed, and to see them streaking through a tide lop off the wind, or running up a mud flat at low water, with both sails drawing full, is a wonderful sight. To windward they are not satisfactory, having so little hold on the water, and their crews, who manage them deftly, yet have to trust a good deal to ground-tackle and a sheltering islet when it blows hard. But, with the beauty of their snake-like shape, and the variety of red in their sails, they make lovely pictures to a sailor's eye.

I was struck in Mergui by the amount of corrugated iron and iron castings used by the Burmese in their shrines for roofing, railings, and scrollwork. They find the material cheap and lasting; but it must be owned that from an artistic point of view, that from which one cannot help regarding all architectural effort, the prevalence of its use is deplorable. Iron is a very poor substitute for the beautiful wood carving for which the Burmese were justly renowned of old, and surely it marks a downward course in their ideas of beauty.

During our stay we made a three days' trip up to Tenasserim (Siamese, *Tenusi* or *Tenu*), which stands on a small plain at the junction of the Great with the Little Tenasserim river flowing in from the southward. The line of the old walls can still be seen, with the remains of several old Siamese-built wats or monasteries, among them Wat cheng (Wat Chang), built in 1380. The population consists of a few hundred Burmans, and scattered through the country round, Karens and Siamese.

Except for the extensive jungle clearings where the big timber has not yet grown up again, which are obviously the work of a formerly thick population, there are no signs of the early importance of Tenasserim and its seaport Mergui when under the Siamese. It is a rare thing, where British rule has had so many years to make its influence felt as is the case in the Tenasserim provinces, to see so small a population and so little material prosperity.

The primary cause of the ruin and depopulation of the west coast was the merciless conquest of Alaungphra in the last century. Subsequently fell the Siamese capital of Ayuthia, to which Mergui and Tenasserim had been the chief starting-points of the overland route from the west. That they have never recovered their position is due in part to the growth of English power in the straits, which has created the trade of Singapore and Penang, and has suppressed the piracy which was once rife in those waters; and in part to the development of steam navigation, which has robbed the overland routes of the peninsula of their value. These routes have been so neglected as to be scarcely known except by the Burmans, Karens, or Siamese living in the hills, who still occasionally use them. Of the supposed carriage road nothing is known,

and I suspect it was never more than an ordinary cart trail. That ox-carts were used for a part of the journey is, we know, a fact, but in Siam these carts travel in all except the roughest hill country, and they are quite independent of roads as we understand the term.

Of the three old main routes from Mergui, the northern went up the great Tenasserim by boat to Jelinga, which was apparently on Klong Sarawa, and thence over the watershed into the valley of the Menam Phipri, north-east down to the town of that name—which, by the descriptions of its importance, must be the present Pechaburi.

A second route from Jelinga, more to the southward, went down the valley of Klong Pran to the coast town, Muang Pran, probably the present Prau.

A third route from Jelinga went to a place variously called Queal, Couil, and Kiu, supposed to have been on the Phipri or Pechaburi river. I take it, however, that the Couir passed by Bishop Bérythe was the same, and that it is the modern Muang Kuei or Kuwi, to the south of Muang Pran.

It must be remembered that the hill trails invariably follow up and down the valleys of streams, where the gradients are easier, and the map shows that, crossing from Klong Sarawa, one may descend one of the three main lines of drainage, Menam Pechaburi, Klong Pran, or Klong Kuwi.

If there were no boats on getting to the coast, a party would follow along the main north and south trail, which is at present used a good deal, through Muang Pran, whence the bishop took five days to Pechaburi. He travelled very slowly, for he took four weeks between Jelinga and Pechaburi, while the average time for lightly equipped parties used to be ten to sixteen days from Tenasserim to Ayuthia. To take such a time he must have dawdled unconscionably, or else have gone a roundabout way; and it is quite possible he went up the Klong Sarawa to its source, round the shoulder of Kao Hlewada and down to Kuwi, where they expected to get boats. Such roundabouts are often necessary in jungle travelling when other routes, as frequently happens, are temporarily blocked by fallen trees or landslips.

I am the more inclined to think that Queal, Couil, Kiu, Couir, Kuei, and Kuwi are the same, and that in Dr. Anderson's map Kiu is placed too far north, as he speaks of "Kiu, where these mountains (Sam roiyat) approach the sea." Now, the Sam roiyat are a well-known landmark to Siamese fishermen, and lie in 12° 13′ just to the north, and within sight of Muang Kuei, or Kuwi. They are not, as Harris says, a portion of the main mountain range, but are a geographically and geologically distinct mass of limestone peaks; and the track from Kuei, or Kuwi to Pran passes west of Sam roiyat on the low country between them and the hills of the axial range. Again, Kiu is mentioned as 140 miles from Bangkok, almost the exact distance of Kuei, or Kuwi; and, in

reference to Harris's voyage, mention is made of the custom of watering vessels at Sam roiyat or Kiu, especially when bound eastward to China and Cochin China. This custom has lasted to the present time, and twenty years ago, before regular lines of steamers were trading with Bangkok, the large four and five masted junks used to warp with great grass hawsers the whole way to Sam roiyat, or Kiu, water there, and having thus made a long leg to windward, they could weather Cape Liant, and look well up for Cambodia point on one tack with the prevalent south-westerly wind, and thus avoided the difficulty of beating out of the narrow inner gulf.

The coast boats and small Cochin China craft still beat down along the coast to Sam roiyat, and Muang Kuwi, until they can make a long leg off the shore, and fetch their port on the opposite coast; and many a red prayer-paper is offered off those headlands, as the little craft comes round, and sheets are trimmed for the long reach seaward.

A fourth route was overland from Mergui across the Tenasserim river at Jelinga, and down to a place called Xam on the coast, said to be south (?) of Kiu. I am not aware of any name answering to Xam at the present time.

Further south a fifth trail crosses the low pass of Kao Maun, lat. 11° 49′, where the Siamese territory is narrowed down to some 15 miles by the approach of the mountains to the shore of the gulf. The route went up the valley of the Little Tenasserim and Klong Tin Kuan in a general south-easterly direction, over the pass, and down to Bang Narom in 11° 50′. There are some good boat harbours at that point, inside Ko Luem and Ko Lak. Mr. Leal, who went over by this route from Siam in 1826, says that on the second day they reached a point where the road branched off in two directions, the right leading to Bangtaphan, and the left to Mergui. This, as Bangtaphan is some marches southward, must be a mistake, and the left must have been the road to Bangtaphan, and the right to Mergui. In the same way, below he says one road led east to Mergui, an obvious mistake for west.

A further possible route, followed recently by Dr. Keith, is up the Little Tenasserim to its source, and down by the valley of Bangtaphan. More south, again, a track crosses the frontier range from the Lenya river in 10° 59′ to Chumpon. It is a good example of the way the trails follow the natural lines of drainage. The most southern of the trans-peninsula roads which has any connection with the Tenasserim provinces is the well-known one from Kra to Chumpon, a trail coming into Kra from the upper waters of the Lenya river northward.

While on the subject, it may be noticed that the old main routes from the Bay of Bengal to the Gulf of Siam, across the Siamese Malay states, mentioned by Crawford and others, are still much frequented by Siamese and Malays for purposes of local trade. The most southerly is from Keda to Patani; and another from Keda to Songkla (or Singora)

is on the line of the proposed railway, now just begun. Further north Trang is connected through Kontani (Captain Low's Khoan Tani) by a track which crosses at a very low elevation above sea-level with Ligor and Lakon. A fourth crosses from Paklao, a village lying abreast of Ponga in the north-east corner of the Junk Ceylon bight, into the valley of the Bandon river, and to Chaya; but I need hardly say that the tin trade from Tongka mentioned by Harris has left that route in favour of the straits. From Paklao there is also a rarely used trail going more nearly due east to Lakon.

There is a more northerly route from Takuapa eastward into the Bandon valley, and above that a track connects Renong and Lang Suan.

The general direction of these routes will be seen to be considerably north of east. They are not likely to become neglected, as has been the case on the Tenasserim frontier, from the fact that the states on the east coast of the peninsula are completely shut up by bad weather the whole of the north-east monsoon season, and the only way out of them is thus across the country to the west coast. The north-east monsoon, which means fine weather under the lee of the peninsula, means in the Gulf of Siam strong on-shore gales and heavy rain, and a tremendous sea prevails upon the peninsula east coast. As there are few harbours, and what there are are generally in the mouths of shallow rivers protected by bars of sand, the boats are laid up, and navigation is practically suspended in that season, as in the south-west monsoon it is on the west coast.

The strength of the monsoon on the eastern coast would have to be reckoned with in carrying out any Isthmus of Kra canal scheme, for Chumpon Bay is fully exposed to the north-east sea, which rolls in heavily on the shallow soundings. Tremendous harbour-works and very expensive dredging would have to be resorted to to enable vessels to enter and leave the port. The shoals in the bay are continually shoaling up, and the bar of the river alters from year to year.

An alternative might be found to the southward in Sawi Bay, a large shallow-water indentation, and it is possible that the Laun river might give better access to it from the Pakchan than Kra higher up. To admit big ships, heavy work would have to be undertaken on the 2, 1, and ¾ fathom patches, which lie outside the Pakchan; and when all was done, it may be doubted how far would vessels choose this route, with the bad weather and intricate navigation to be encountered on one side or the other, in preference to the straits.

(*To be continued.*)

Note on Mr. Warington Smyth's Map.—The map of the chief passes from Siam into Tavoi is based on Lieut. Bagge's map, with additions by Mr. Warington Smyth. The trade routes shown on the smaller map have been taken from a sketch-map made by author.

THE WESTERN SIERRA MADRE OF MEXICO.*

By O. H. HOWARTH.

It is a common remark that there is a family likeness between all mountain ranges. In a general sense, it would be strange if it were not so, if one considers how comparatively few and essential are the prime causes which co-operate in mountain-building. Were we to eliminate the results of slow variations of strain or compression, sudden or chronic eruption, and the external erosion of yielding materials, the surface of a planet might conceivably remain changeless for indefinite ages. Yet to the eye of a student of mountain structure it may be said that there are at least not fewer variations upon fundamental types than in the human family itself. A European, for instance, may not readily discriminate between the families of a Mongolian race, or between the individuals of a Zulu or an Esquimaux family. Yet we know that such distinctions are merely a matter of habitual practice and opportunity for frequent and close observation. The same applies to mountain structure.

I propose to notice a few such features of family likeness—as well as of family unlikeness—observed within the past six years, while traversing the western ranges of the North American continent at various points extending over almost their entire length from Oregon to Guatamala, but with especial reference to their less-known developments in the western Sierra Madre of Mexico.

I must refer but briefly, and only by way of comparison, to the scenes and characteristics of the grand ranges of the north—the Siskiyus and the Cascade Range, the Sierra Nevada and the Rockies proper, and the vast and complex ramifications of New Mexico and Arizona, and of Upper and Lower California—fascinating as all these are in a thousand aspects, and as yet by no means so thoroughly explored as may be supposed.

While the general ranges of the Great West, from Alaska to the Mexican frontier, are interrupted and divergent to a greater degree than is yet indicated on any comprehensive map, there is, nevertheless, no interval which actually breaks the continuity of the enormous rib of high elevation dividing the Pacific slope from the central plains of the North American continent. The general altitude of 13,000 to 15,000 feet attained by the highest summits is characteristic of the whole ridge, though the frequency of such heights is less noticeable than in some other ranges, such, for example, as the Great Atlas and the Caucasus. The general conformation of the ranges north of the thirty-second parallel—that is to say, north of the Mexican frontier—is roughly that of a double parallel ridge, with a depression (still of high altitude)

* Paper read at the Royal Geographical Society, June 24, 1895.

between the main ranges. This high plateau, running from north-north-west to south-south-east, is represented by the plains of Eastern Washington; Eastern Oregon; the Klamath and Malheur Lake districts; nearly the whole of Idaho and Utah, including the basin of the Great Salt Lake; and the plateau of North Arizona, intersected in places to a vertical depth of more than a mile by the Grand Cañon of the Colorado.

This dividing plateau gradually descends southward until it terminates, so far as elevation is concerned, at the head of the Californian gulf; but the two main parallel ridges are still represented as far south as the Tropic of Cancer by the peninsula of Lower California and the Mexican Sierra Madre—the latter continuing southward without a break to the extreme limit of Mexican territory, and beyond it to the narrowing of the continent at Panama. The Sierra Nevada is continuous into Southern California, where the designation of Sierra Madre first appears; and the Rocky Mountains through New Mexico into Chihuahua and Sonora, and thence between the Mexican states of Sinaloa and Durango, Michoacan, and Guerrero, and the other western states, where it bears the same name throughout.

The unbroken continuity of the Sierra Madre for nearly 2000 miles of length, and from 200 to 300 miles of width, makes it, in fact, one of the largest compact mountain areas of the world. Excepting the great volcanic peaks of Popocatapetl and Ixtaccihuatl to the south-east of Mexico city (which attain an altitude of over 18,000 feet), it is not distinguished by many points of exceptional elevation, but rather by the remarkably uniform altitude of the central ridge, which maintains its height of 11,000 to 13,000 feet for several hundred miles with little interruption. The result of this, geologically, seems to have been a thicker and more uniform deposition of certain tertiary formations; and these, having been subjected to the more uncertain and intermittent erosion of tropical weather, are the cause of a marked distinction in the scenery from that of the northern ranges. While the comparatively isolated summits of the Rockies—such as Mount Hood, Mount Shasta, Long's peak, Pike's peak, and the Spanish peaks—impress and delight the observer with their vastness, the Sierra Madre abounds more in scenic surprises, and the constantly varying charm of the unexpected.

Travelling, for example, through the central ranges of Sonora (the north-western state of Mexico), one may traverse a group of high dome-topped hills, beautifully studded with dwarf pine or mountain oak, and clothed with long grasses—the home of the antelope, the white-tailed deer, and the wild turkey—and with scarcely any characteristics of the main range. In another mile these may be suddenly cut off by some huge chasm surrounded by towering crags and steep water-torn gullies, perhaps sectioned out at their bases by remains of the curious terraced gardens constructed in past ages by a human generation now extinct and untraceable. Then may follow a glimpse of the main range

crowned with its pine and cypress forests, and possibly streaked here and there with snow. At high altitudes throughout this range occur also the singular and charming level plots called the Llanos, and known in the Rocky Mountain range as "natural parks." These are frequently seen at a "parting of the waters," where an infant stream creeps quietly through the deep alluvial soil, and nourishes the meadow-like expanse surrounding it. Groups of stately trees are dotted over the tract, more varied in kind under the genial Mexican sun than further north, and the atmosphere and surroundings inspire an almost indescribable wish to seclude one's self in such a home as the spot suggests. Within another hour or two of mule-riding, all this may have given place to a series of precipitous heights, wild, ragged, and nearly bare of foliage, excepting cactus and mesquite; and topped, it may be, by some strangely jutting dyke of quartzite, carrying its hundred or two hundred ounces of silver to the ton. Going further south into Chihuahua, where the ranges of porphyritic cliffs are still loftier and wilder, features of exceptional interest will seldom fail to present themselves within the space of a day's ride. Here may be found at intervals the most fantastic forms of weathered "chimney stacks," or turrets, of decomposing gneissic granite, or castellated ridges recalling many others on the course of the Green River and the Colorado. Here one may see, on a steep declivity of forest soil, a huge trench scored out by the fall of one of those immense meteorites which so curiously seem to have made choice of Mexican territory as their resting place on our planet. Here also, amongst the fastnesses of the highest ridge, not many miles from the mining camp of Pinos Altos, has been found a cascade which may probably—though I cannot venture to certify the fact—claim the distinction of being the highest vertical waterfall in the world. The volume of water passing over it in the rainy season is often considerable, and an actual measurement from the ledge showed a clear perpendicular drop of 948 feet before the water touches rock again.

Owing to the large proportion of mountainous country which occupies its area, Mexico is not a land of great rivers; and even its perennial streams are comparatively few, the rainfall taking place wholly between the months of June and September, except at certain high levels, where the "equipate," or winter showers, occur in January. This, however, applies only so far north as the line where the summer rains, characteristic of the tropics, commence. That line approximately cuts off the northern states of Chihuahua and Coahuila, which are for the most part extremely dry, and represent an intermediate zone between the tropical region and the Californian climate where rains occur in the winter, and irregularly at other seasons. The permanent streams flowing west from the Sierra Madre have generally direct and short courses, not exceeding 60 to 80 miles, and are, of course, subject to high flood during the wet season. The natural storage

reservoirs are also few in number, but those few comprise a lake district almost unsurpassed in the world in respect of its scenery, climate, and general interest. In the heart of the Sierra Madre country lie the magnificent lakes of Chapala in Jalisco, and Cuitzeo and Patzcuaro in Michoacan: the first a body of fresh water 60 miles in length by 20 in width; the other two about half that size, and distinguished by every feature of natural charm conceivable. Yet the population of this singularly attractive region still remains extremely sparse, its wonderful fertility being only availed of here and there by the poorest race of peasant farmers, and a few growers of maize and coffee. On one of the islands in the Lake of Cuitzeo, a small independent tribe of peaceable Indians have been established from time immemorial, with customs, language, and physical characteristics distinct from others in the same state. To which of the three great races of antiquity—Aztec, Toltec, or Acolhua—these were allied is unknown.

It may be of interest to note here the appearance—or, as regards Mexico, I should perhaps say, the doubtful appearance—of indications of glacial action. I have not, from personal observation, become acquainted with any instances in the Sierra Madre, though by no means prepared to say that they do not exist. But the conditions above mentioned relating to the structure and probable tertiary history of the range, do not suggest the occurrence of glacial signs as likely. There is no question, however, that the operation of ice-flow is traceable in New Mexico and Colorado at several points on the southern branches of the Rocky Mountains, where neither the latitude nor the elevation would lead one to seek it. My attention has been drawn quite recently to a number of remarkable examples of the "glacial mill"—the peculiar bowl-shaped hollow excavated in granitic or other rock by the grinding action of a captured boulder in the sub-glacial stream. One such instance I found last summer on the very summit of a granite mountain in the Estes park in Colorado, at an altitude under 9000 feet, and in a position entirely isolated from the surrounding ranges. The tale told by a single case such as this is of the highest interest to the geologist, and should prompt every observer to note the occurrence of similar signs at any points in the southern extension of the range. The district of chief interest to examine with this view would, in my opinion, be the north section of the western Sierra Madre down to the latitude of the Tropic of Cancer, abreast of the end of the Lower California peninsula.

The effects of climate and water in the higher altitudes of the Sierra Madre have frequently been extremely singular. In the more siliceous formations of the porphyritic group, where decomposition has proceeded from within, cave formations occur at the most unexpected points. Among many instances, I recall especially an enormous arched cavern observed in the north of Sonora, almost at the summit of an isolated

conical peak some 4000 feet in height. But for its unique situation it might have been supposed the work of human design. It was, no doubt, the difficulty of access to such retreats that first led to their occupation by wandering tribes as places of safety and defence.

Eccentricities of rock structure are found in infinite variety—if, indeed, the term "eccentric" can be used where Nature has not bound herself by any prevailing law. Many of these strange forms are due to the inherent character of the range, and occur at points where an immense compression appears to have been exerted within a very limited area, and upon material which was probably of an unyielding nature throughout the period when the compression occurred. The solvent action of hot water, the local effects of earthquake, and of exceptional torrents in wet seasons, have also taken part in varying degrees in the production of these peculiarities. While travelling through the western outskirts of the range, from the coast regions of Sinaloa, I passed within view of a mountain peak so accurately pyramidal in form that, if on a smaller scale, it would at once have been noted as an artificial structure. The pyramid being so familiar in southern Mexico as the conventional form of pediment for temples and sacrificial buildings in ancient times, I was curious to ascertain whether this natural accident had not suggested the same use on a grand scale, and made careful inquiries of the peasantry as to whether any remains existed on its summit. It was interesting to find that the suggestion of Nature had not escaped the attention of the sun-worshippers. Foundations of walls, and the small circular pits—perhaps receptacles for the blood of victims—were described to me as having been noticed on the summit of this mountain, leaving no doubt that it had once been consecrated to the same purpose.

For several centuries the extraordinary wealth of the Sierras of Mexico in metalliferous veins—and especially those of silver—has been known to the world, although, from a commercial point of view, the actual production of that metal has latterly become a controversial and somewhat depressing topic. But the vast preponderance of one metal in this particular "squeeze" of the Earth's crust is none the less interesting. For the present purpose it would lead us too deeply into a technical study to discuss the features of this mineral storehouse. A few general facts only can be noted, illustrating the peculiarities of its formation.

The fissures of the great silver-veins have usually been formed at points where the movements which gave rise to them have been at once deep-seated and apparently restricted in space. Hence they are generally found in the most inaccessible situations, and amongst rock scenery of the wildest and most chaotic character. Frequently their outcroppings are at the highest elevations; and many a mining camp may be descried amidst the cañons of the Sierra Madre, perched

amongst precipices where even the agile mountain mule would hardly be supposed to find a footing. Two singular characteristics of the great "mother-veins" are noticeable throughout the range. The "strike" or course of the main veins is almost invariably from north-east to south-west. So constantly is this the case that many miners would feel little faith in a vein that ran in any other direction. The other peculiarity of the deep-seated veins, usually described by experts as "true-fissure," is their very near approach to a vertical position in the rock containing them, frequently not exceeding 5° to 10° out of the perpendicular. Thus even in early times the workings have penetrated to unusual depths, some of the old mines being down to 1500 or 2000 feet. A visit to such a mine, which has been worked on the Mexican "sistema de rato," or rat's plan—that is to say, burrowing after the vein wherever it leads—is an experience not to be forgotten; nor, if one values one's safety and comfort, to be repeated. I remember such a visit a few years back, when to the general perils and difficulties was added the sudden assault of an immense colony of large bats, disturbed from a disused tunnel, from which they fled in such swarms that torches were knocked out, hats brushed off, and the floor of the tunnel, as we returned, cushioned with the bodies of those which had fallen. The naturalist may be puzzled to say by what means these creatures discovered their extraordinary retreat, and how they contrived, evening after evening, to find their way to the upper air by a corkscrew shaft over 300 feet deep, and covered at the top by a wooden shed.

It is scarcely necessary to remark that the ores of silver do not, as a rule, present themselves in a form attractive to the eye, and that the interior of a silver mine is as far as possible from being the fairy palace the name may seem to suggest. Occasionally, however, the bunches of native silver which occur exceptionally in the "wire" or "needle" form are of great beauty, and solid nuggets, though rare, are not unknown. One mine in Chihuahua produced from a globular cavity a solid silver ball weighing 445 lbs., in which scarcely any foreign matter was present. Many of the tales of silver-production which sound more or less fabulous to European ears are undoubtedly quite correct. A single mine has been known to produce the value of a hundred million dollars; and this being a matter of official record at a period when the metal was subject to taxation either by the Church or the municipal governments, or both, the return is far more likely to have been systematically understated than exaggerated. Nor is there any reason to doubt the truth of such stories as that of Pedro Ferreros, a mule-driver of Pachuca, who afterwards became Count of Regla, taking his title from the name of his mine. On the occasion of the baptism of each of his children, the procession walked from his residence to the church upon a pathway paved with bars of silver.

I was myself acquainted with a miner owning several properties,

who possessed in one of his mines a vein of ore containing from 1000 to 1200 ounces of silver per ton. His habit was to bring down from time to time a single sack of this ore, and as often as the ordinary produce of the smelter was turned into the refining furnace, a modicum of this concentrated wealth was added, so as to bring the daily assay up to the point which satisfied him, and assure an unvarying profit from one years' end to another, no matter what the other mines produced.

The most striking peculiarities of rock formation are observed wherever compression has been most severe over a limited area. This, as already noted, is specially frequent in the Sierra Madre, and cases of severe "squeeze" on a grand scale, though they have unmistakable counterparts in the northern ranges, are much more frequent in Mexico, producing the features which are illustrated comparatively in my photographs. This is especially the case in certain parts of Sonora, Durango, Sinaloa, and further south in Oaxaca. But in the presence of recent volcanic activity—as in the neighbourhood of the volcano of Colima, or that of Jorullo in Michoacan—the disturbance has been rapid in action, more superficial, and has given rise to a structure showing less constraint in form, and more resemblance to the spreading ranges of Arizona and New Mexico.

The Sierra Madre possesses many curious instances of the accidental markings on mountain surfaces which from a distance attract the fancy or rouse the superstitions by their resemblance to human or other familiar figures.

The well-known mountain of the Holy Cross in Colorado has more than one replica in Western Mexico; and many a natural seam or trench or jutting dyke has supplied some fanciful name to its locality, from similar resemblances. The most striking instance, by far, which I have yet found in the Sierra Madre is the figure called by the Mexicans La Muerte (Death), on the eastern flanks of the range, overlooking the great Llano, or level plain, of Durango. It is merely a huge scar, or group of bare watercourses on the steep mountain-side. From a certain point of view the resemblance to a gigantic human skeleton—one hand on its hip, the other raised aloft, and one foot lifted in the attitude of a grotesque dance—is so inimitably accurate that one can scarcely wonder at the superstitious awe with which this mountain is regarded. It is hard to feel assured that the figure has not been somewhat trimmed up or finished by human agency, though the situation and its dimensions, in fact, preclude any such possibility.

None of these figures are perhaps more singular in their similitudes than the Queen Eleanor rock below the Twin Sisters mountain in Colorado, or the various fantastic groups of weathered sandstone in the celebrated Garden of the Gods at Manitou. But the Mexican has not yet appreciated the theory of coincidence, nor recognized the fact that amidst the countless freaks of natural sculpture it would

be strange indeed if there were not a few that counterfeit other types of form.

At present I am acquainted with only two examples, in the ranges of the Great West, of a columnar structure of igneous rock resembling that of the Giant's Causeway. These appear to have resulted from a peculiar distribution of pressure, or rather, perhaps, to a partial release from pressure where the rock was liable to split in one direction. The two cases are widely remote, one having been observed in a railway cutting in the north of Oregon, and the other on the course of a stream in the state of Jalisco, Mexico. The rock is in each case a basaltic lava. The resemblance is illustrated by the photographs.

The climate of the Sierra Madre includes a large proportion of the "tierra templada," or temperate zone, represented by nearly the whole interior plateau of Mexico, which, though tropical in latitude, can scarcely be so described as to its temperature and products. I have more than once returned from that country to the north of the United States in July or August when the heat was far more severe in Chicago and New York than in any part of the interior of Mexico. The higher altitudes reach the "tierra fria," or cold zone, in which snow lies, more or less, between the months of December and March. The line of perennial snow in Mexico cannot be defined as much below 14,000 feet, and this is apparent only on the highest volcanic peaks mentioned above. On crossing the main ridge of the Sierra Madre between the states of Sinaloa and Durango in March, 1893, I found no snow at 8000 feet, although frosts occurred at night. The heat in the lowlands of the west coast at that season was becoming severe by day, but the nights were still cool; in fact, a hot night is a thing almost unknown in Mexico. Owing to the proximity of the high ranges to the coast-line, and the rapid downflow of cold air, cold mists and even frosts are encountered on the coast in winter at night, while by day the tropical power of the sun is still considerable. The exhilarating nature of the mountain atmosphere in the pine forests above timber-line is a thing not easily forgotten. At no other elevation in Europe, Africa, or America have I ever experienced in the same degree the peculiar sensation that for the first time one realized the vitality of life, and could contrast it (with a sort of self-reproach) with one's previous career on a lower grade of being. Unfortunately, the logical deduction from that experience is the somewhat impracticable one that life should be spent either on the heights of the Sierra Madre or nowhere.

At an altitude of about 4000 to 5000 feet commences the zone usually spoken of as "timber-line"; that is, the level at which the growth of mountain oak and certain trees of the tropical habit give place to forests of pine and cypress. In the middle latitudes of the range, and at its greatest width, these are of vast extent, and in the

more sheltered portions very heavy timber is developed. Though not equalling the giant productions of the north, trees of 100 to 150 feet in height, and 10 to 15 feet in girth, are frequently met with. The contrast above this line, in the matter of animal life, is striking. While the barrancas and mountain slopes up to 2000 feet are swarming with birds and insects, and ringing day and night with the chatter of cicadæ and tree-toads, the silence of the pine forest is unbroken at all seasons, except by the occasional note of the few birds which find food and a home there. Deer are tolerably abundant, and the brown bear inhabits the cañons, though by no means easily hunted out of his favourite resorts. Yet the tropical character of the fauna and flora up to the very edge of the timber-line is distinctly marked. Large flocks of parrots of several varieties are daily visitors at this altitude, coming up in the early morning from the hot lands of the coast in search of some favourite fruit or seed, and returning at sundown over distances which must involve a daily flight of at least 100 miles. The pine forests are generally devoid of undergrowth, except in the deep cañons, and are frequently carpeted with a fine lawn-like grass. I have noticed a few varieties of cactus—especially the Mammillaria—as high as 2500 feet, and, according to local circumstances, they may probably be found at greater elevations.

For reasons which are easily appreciated, the population of these mountain districts has always been scattered, and more or less migratory. Next to the variety and uncertainty of the sources from which they have been derived, the chief cause, perhaps, is that, being recruited mainly from amongst a people of tropical temperament and habits, the winter climate of the higher altitudes has always been an obstacle to their permanent residence.

Even now, had it not been for the inducements of agriculture in the fertile upland valleys, and the still stronger allurement of their vast wealth in silver ores, it is likely that the Sierra Madre would still be the undisturbed retreat of the bear, the jaguar, and the antelope. But unquestionably the most interesting ethnographic feature of the present period is the continued isolation of a few distinct races which have been planted there from original sources, and whose fusion with the Mexican nation of to-day has been retarded by the circumstances of their life. These sources are still distinguishable, more or less, as North American, South American, and probably Asiatic, with, of course, a contingent of European since the Spanish invasion. The chances which have scattered these various families so unaccountably are the resultant of too many fortuitous occurrences in past times to leave much hope of tracing them now. Yet the visitor who passes amongst them cannot but speculate with the deepest interest on their origin. Why, for instance, do we find in the deep and remote cañons of Sonora those few remnants of incorrigibly hostile Apaches whose hand is against

every man's, and only a little further south, on the heights of Chihuahua, the timid yet athletic race of cave-dwellers, whose only anxiety is to hide from even the friendly stranger? Here we have a fighting race whose predatory instincts will never be subdued until their final absorption into the Mexican nationality, and, as it were next door to them, a race whose disposition has for ages been eminently peaceable. While the only instinct of the Apache is to shoot down the stranger and commit raids upon his property, the life of the cave-dweller is simple and hardy, and his cultivation of physical health a religion. Their young men scour the plains like an antelope, and hunt down the deer on foot till it drops exhausted. They are even systematically trained to this tremendous exertion by a game somewhat allied to our golf, in which they are required, before qualifying for the deer-hunt, to drive a wooden ball over the level plains for 100 miles without a halt. I am able to quote an instance in which a youth of twenty years pursued a deer on foot for a distance of 135 miles before he exhausted and killed it, and within two days carried it back to the point of starting.

Why, again, do we encounter, not much further south, the quiet, sympathetic, and somewhat artistic tribe of the Cota Indians of Durango, and in the same State, as well as further east in Queretaro and Hidalgo, the abjectly miserable nomadic families, wholly distinct in colour and physique, and more resembling the distant Shoshones of the Yuma Desert? The former are distinguished by their cordiality to the stranger, and their dexterity in manufacturing those trinkets and implements which he delights to collect, while the latter seem incapable of any purpose in life but to exist on the barest possible necessaries.

Still more curious is it, on proceeding yet further south, to find on the western mountains of the Tehuantepec isthmus the stalwart and finely developed Zapotec Indian, whose splendid physique and superior intelligence exemplify the real or supposed "noble savage" of the American continent. The women of his race are also remarkably handsome—a characteristic which, so far as I am aware, can scarcely be claimed by any other Indian family in Mexico.

That the origin of these local tribes is attributable to different and far-distant sources is further evidenced by the diversities of their language. Instances are encountered at all points of the range where Indians are found, from New Mexico to Guatemala, where two settlements possessing a common or nearly common dialect are separated by another with a language entirely foreign to them. Of this I met with an instance in the autumn of 1893, on the east bank of the Rio Grande, at the foot of the Ute mountains in New Mexico, where the speech of the original Pueblo Indians of Taos is known to the Utes of another Pueblo in the second valley northward; while that of a tribe inhabiting a cañon between the two is wholly strange to both. Amongst the various tribes of so-called Snake Indians, of whom the

Shoshones are a branch, there are said to be no less than seven distinct languages, which have preserved their individuality notwithstanding the wanderings and subdivisions and occasional annihilations of these tribes from distant periods. At this moment there still exists a code of signs used by the Apaches of Sonora, unknown, it is believed, to intermediate tribes, but recognized by the Flathead Indians of Wyoming, more than 2000 miles to the north. It would be venturing beyond the scope of a geographical account to inquire more closely into the distinctive histories of these mountain peoples. But it may be observed that they confirm strongly the view which I have long entertained as to the existence of a large though scattered contingent of Asiatics amongst the early races of Central America.

In modern times the mountain ranches and mining camps have, of course, introduced a new contingent of population from other sources. Amongst that section which may strictly be described as Mexican there remain many evidences of contact with the conquered races of the Montezuma period. Customs and industries still prevail which must be identified with those times, though no amount of inquiry will avail, in many cases, to fix their precise origin.

Not the least remarkable characteristic of this mountain population of Mexicans is the prevailing condition of abject poverty in which they apparently prefer to live. There seems to be in this an actual heredity, apart from other and proximate causes, such as occasional barrenness of soil, severity of climate, or native indolence. The latter is, of course, a chronic condition amongst them; but even in individual cases where it is less strongly marked, there seems to be an actual preference for the extremes of exiguity, simply because the same habit of needless and inexplicable misery has descended from father to son. It is no uncommon experience to see an almost incredible degree of actual physical suffering persistently endured under circumstances where the commonest comforts might be obtained almost without an effort, and this amongst a comparatively intelligent class in which the profound ignorance of most of the Indian tribes cannot be assigned as a reason. Many a time it has chanced to me to pass the night on the floor of some wretched "jacal," or shanty of interlaced saplings, where, at an elevation of 6000 or 7000 feet, the March winds rushed through almost unhindered. Here I have seen the Mexican family and its guests stretch themselves around me, half wrapped in their scanty serapes, some prostrate with influenza, some with chronic bronchitis, and all bemoaning themselves audibly in the misery of cold, while for miles around the doors lay countless thousands of huge pine-logs and fallen branches, rotting on the ground, and five minutes' work by one of the children might have brought warmth and comfort to the whole community. But the scrap of fire used for toasting the tortilla has been allowed to die out. It has never been the custom to use heat for any purpose but cookery; and the

log-fire indulged in by the chance traveller for his own convenience is regarded as a strange extravagance, consistent only with those general conditions of exotic wealth which he is invariably supposed to represent. The accompaniments of a pack-mule carrying a blanket, an overcoat, and a box of tinned provisions, are sufficient to mark the foreign traveller of wealth and luxury, and draw upon him the wondering attention of the populace. At the same altitudes ranches are met with where, in the summer season at least, every means exists for rendering the condition of life easy and even luxurious, and a bountiful supply of such common necessaries as eggs, milk, fowls, fruits, and vegetables could be maintained without cost and almost without labour. Yet the very free gifts of Nature are ignored because it has been the custom to live upon horse-beans and tortillas, and there is no precedent for attempting anything more.

The remains or traces of ancient habitations throughout the western range of Mexico are so numerous and varied in structure as to form a study in themselves, upon which volumes might be written. To describe and compare even those few which have come within my own observation would be a far greater task than time and space will allow. I may select, however, one of a typical class which was visited in the spring of 1893 during a journey into the Sierra Madre in Sonora, and which has not, I believe, been examined by any other European. The situation, in the absence of any local nomenclature, is not easily described; but the site is an offshoot of a valley in the heart of the wildest mountain region about 300 miles south-west of the American town of Deming, on the Mexican frontier, and separated by two high ranges from the valley of the Bavispe. A small tribe of Apaches are said to be located somewhere in the vicinity, although I could obtain no definite information as to their whereabouts. The valleys are deep and narrow, abundantly clothed with vegetation, the altitude being under 3000 feet, and tenanted by deer, antelopes, and wild turkey in large numbers. This offshoot is a short jungle-grown cañon amongst the intricacies of the mountains, approached by a riding-trail leading towards Bacerac. It is closed at the upper end by a vast vertical cliff of horizontally stratified breccia some 200 feet thick, dotted with embedded boulders, and having a foot-slope of broken rock. At the base of this cliff is a hollow formed partly by the washing down of loose materials, extending for nearly its whole length. At the back of the hollow it is prolonged by several long caverns on an ascending grade, penetrating to further depths within the mountain, and half filled with rubbish heaps containing many curious relics of early habitation. The entire front face of this singular natural fastness had been fortified with concrete walls, behind which chamber after chamber had been constructed in and beneath the loose material, ranging inwards on a level beneath the natural caves. These inner chambers were absolutely without

light, and on entering them with a candle I found access from one to another by means of small square openings in each back wall, about a couple of feet above the floor. These were only of sufficient size to permit a man to creep through, and were evidently intended to be easily blocked. The chambers were entirely empty and clean, the floors being of dry earth, and all the walls, both inner and outer, whitewashed. In this dry atmosphere, the concrete walls, and the roofing of carefully sized round pine logs and canes, had remained in as perfect preservation as the day they were built, and were of far superior workmanship to the ordinary adobe houses constructed by the Mexicans or Indians of to-day. In the outer line of wall, splayed loopholes of peculiar form were provided for the discharge of arrows, and other special openings for the entry of the occupants. While the natural caves were used as storehouses and depositories for clean rubbish, the subterranean chambers were evidently devised for the security of women and children, and probably as sleeping-places. A Mexican who accompanied me was greatly struck with the identity of this system of successive chambers with that used by the Chinese at the present day. His independent conclusion that the constructors of these buildings must have been of Asiatic origin appeared to me well worthy of note. With the steep slopes of broken and jagged rock below, covered with tangled undergrowth, a more perfectly impregnable site for such a dwelling could hardly have been devised.

The period of this remarkable fortress it is impossible to assign; it may, however, have been occupied by the ancestors of the present rapidly vanishing Apaches at a time anterior to the Spanish conquest—probably much earlier. The neighbourhood of the terraced gardens, fixed receptacles for water, and numerous irregularly placed burial-sites indicate the permanent habitation of a people who, while industrious, and perhaps even luxurious in some degree, were accustomed at any moment to attack and defence, and to the protection of their community. It is noticeable that all the cave dwellings, fortifications, and burial-places of this region are now described by the general name of "Montezumas"—meaning, presumably, works of the Montezuma Indians; though this, of course, indicates nothing more than the races found in occupation at the period of the conquest.

Amongst various objects in the rubbish-heaps (which, unfortunately, time did not allow me to examine carefully), I found the dried rind of a small melon, and numerous cobs of a very small species of maize, neither of which, so far as I am aware, is to be found in Northern Mexico at the present time. Broken pottery was abundant, but any articles of utility are likely, if not buried, to have been removed by subsequent wanderers. Not far from the same spot has been found a huge "olla," or water-tank, formed by lining a globular excavation in the rock with clay and (probably) burning its interior *in situ*. A flight

of steps cut in the rock lead up to a position above the cavity from which the state of its contents could be examined and supplies drawn, though an enemy might never have discovered it.

The remains of the terraced gardens in the beds of the steep gullies of these Sonora mountains were for some time a puzzle to me, their low stone breast-walls leading me to suppose that they represented silted-up dams, intended to have caught the descending waters. But the explanation given by some local miners, that they were in fact soil-dams, into which the torrents had washed the best alluvial matter from the surface, seemed to be confirmed by every appearance of these curious works. A succession of level plots of the highest fertility was thus secured by utilizing the operations of nature, saving the labour of levelling and ploughing unbroken ground on steep and inconvenient declivities. They are simply an outcome of peculiar surrounding conditions. Further south, amongst the abandoned mountain villages of Sinaloa, Jalisco, and Michoacan, where the mountain structure is less crowded together and the valley bottoms more open, I know (at present) of no similar examples. These latter, moreover, were the domiciles of a wholly distinct race, who left their record in the innumerable rock inscriptions, which will furnish one of the most interesting studies of the future in the western Sierra Madre. Rarer and less artistic these records become as one traces them northward in the range; more abundant, varied, and complex as one follows them to the south, until amidst the mountains of Chiapas the story culminates in those marvellous palatial ruins whose origin is one of the unsolved problems of human history.

I will conclude by describing briefly a few of the industrial and other mechanical appliances met with in the course of several journeys into and across the Sierra Madre ranges, and I select those which specially seem to be links with the intelligence of a people whose habits and traditions have now so nearly disappeared. The comparatively warm and equable climate of the Sierra Madre has always invited the application of those means of cultivation and trade which had already been learned elsewhere by the settlers, of whatever period or country, who have made it their adopted home.

In a mountain region the means of transit and of communication between settlements are also of primary importance, and, rude as the devices for effecting these objects usually are, they illustrate the necessities arising from particular natural conditions. As already observed, it is characteristic of the Sierra Madre range that widely different physical features are encountered within comparatively short distances. It is also characteristic of all isolated communities of people that traditional ways and means of accomplishing any particular purpose are accepted for all time as the best. Nor can it be denied that in many cases they actually are so; and the civilized observer, to whose mind

innumerable improvements promptly occur while he smiles at the crudeness of the methods employed, is sometimes surprised at being driven, later on, to the conclusion that the uncivilized appliance is, under the circumstances, the right one after all.

An instance of this occurred to me on having to cross the river Moctezuma, one of the few considerable streams of Mexico. Being on foot, I was conducted to a point where the river (then at high flood) traversed a steep gully some 300 feet deep, and was introduced to a method of transit known as the "trapezio." On each side of the stream, at the foot of the high cliff, was a level bank some 30 or 40 feet above water-level, to which a descent was made by a zigzag trail down the face of the rocks. On each bank was erected a species of upright windlass or capstan, constructed of rude but substantial logs, with a central pivot operated by four arms, after the manner of a turnstile-gate. Connection was made across the river—a span of some 200 yards—by a pair of stout cables attached to each capstan. A collar or runner, consisting of a section of a solid log drilled with two holes, was arranged to slide on the cables, and drawn by a separate rope from each end, wound upon the two capstans. From this sliding block were suspended ropes, by which all freight—human and otherwise—could be slung up in a bunch. On the signal being given by a whistle that the load was ready, four men entered the capstan on the opposite bank, and proceeded to wind the burden across the river. I thus saw a load of half a dozen sacks of maize, several faggots of wood, and five or six Indian women and children, safely packed and landed at one operation. Being a stranger, I was permitted, when my turn came, to occupy the slings with only the company of my servant and a few meal-bags. When packing passengers for the crossing, a cord is passed under the arms, and another under the knees, and tied to the main sling, and thus secured one is launched out over the boiling rapids, with one's life hanging upon a couple of moderate-sized cords. The passage, however, was accomplished in safety, and by these primitive means a very considerable traffic is conducted. The whole mechanism is of timber and rope, of the roughest possible construction, yet solid and effectual. A suspension bridge at the same point would cost, say, £500. The trapezio is probably constructed for less than £20.

Another singular example of mechanical handiwork was an antique sugar-mill, observed while crossing the Sierra Madre from Culiacan, in Sinaloa, to the interior. Its situation was in a deep cañon on the upper course of the Culiacan river, where neither the production of the sugar-cane nor the existence of such an industry would have been suspected. As it was, however, every available patch in the neighbourhood showed a luxuriant crop of cane, and the sound of the crushing-mill proclaimed its existence for at least a couple of miles up and down the gorge. The apparatus consisted of two round logs pivoted in a shallow pit, and

powerfully compressed by straps of some fibrous leaf or stalk. These were caused to revolve by means of a lever to which a mule or an ox or both together were hitched, and the canes passed between the logs by the hands of a man standing in the pit. The juice flowed into a stone channel below, and was conducted into the boiling-vats. These were under a rough shed on the edge of a bank, in which the furnaces of stone were constructed underneath. The concentrated syrup was ladled out and poured into small loaf-moulds cut in a wooden slab. Rough in the extreme as the whole operation was, the produce was undeniably a very respectable unrefined sugar.

Time forbids me to multiply instances like these of what may be termed creative ingenuity, by which industrial appliances are evolved *de novo* by the needs which natural surroundings create or suggest. The geographical and climatic range of the Sierra Madre, varying from a region where pine lumber is felled in the snow to one where ebony and mahogany are used as fuel for baking cakes, contains probably a realm of research, as varied, within a comparatively limited area, as any on the globe. I have endeavoured merely to sketch the points of interest noted during many casual journeys through and about the range, but it is in the hope that, by others to whom the opportunity occurs, a real study may be attempted of some of those of most prominent value. Foremost amongst them I must place the study of the existing populations, because the time is shortening within which their history can be even partially unravelled. The growth of a new homogeneous nation, where the process of fusion is once established, proceeds with strides; and while one wanders amongst those wild crags and recesses, which we hope may never again echo to terrible Apache war-cry, one cannot but regret that the last remnants of the people who might throw a ray of light on the story of their past will so soon have vanished beyond recall.

Before the reading of the paper, the CHAIRMAN (Mr. W. T. Blanford, Vice-President) said: The paper to be read this evening by Mr. Howarth is on the Sierra Madre, in Mexico. As it has unfortunately, owing to the absence of the President, fallen to my lot to take the chair, and as I am entirely unacquainted with Mexico, all I can do is to introduce our lecturer.

After the reading of the paper, the following discussion took place:—

Signor ROMERO: I was kindly invited to attend this evening this interesting lecture, and have enjoyed it very much. I have travelled through the same parts, and the description of them is entirely true.

Admiral Sir ERASMUS OMMANNEY: I think the lecturer traced that the aborigines had some idea they descended from North America. I should like to ask him whether he has any conception whether the Eskimo language has any connection with the ancient Mexican languages.

Mr. HOWARTH: I am afraid very little can be said in reply to that question, for a reason which I think, to a certain extent, I pointed out. The Mexican nation is such an extremely complex one that its languages are consequently complex; the

official language now is Spanish, but it is for that very reason I think the history so extremely interesting. I have been endeavouring to draw attention to the necessity of its study, as soon we shall be losing all those threads which will enable us to make the study of the Mexican past effectual. I am sure the study of the languages would do a great deal to elucidate the very question just asked. If the existing independent tribes in Mexico could be studied separately, and something ascertained about their separate languages, their separate customs, and identification established between them and those to the north or the south, I think there is a great field for inquiry which would have extremely remarkable results. I am afraid it is impossible to say anything worth saying in reference to the identification of languages and habits and customs without a considerable further degree of study, but the point I have been insisting upon is, that if any inquiry is to take place into Mexican history it must take place in the next few years, or all the threads to the past will be lost.

Mr. BLANFORD: I think I need scarcely ask you to give your thanks to Mr. Howarth for an extremely interesting lecture. The question he has raised about the origin of the peculiar tribes found scattered in the mountain ranges is very interesting. It will be well within the memory of many here that a similar question has arisen in the Himalayas, with reference to tribes that are rapidly dying out and are difficult to trace; and it is well known that an interesting tribe living in the Neilgherries have no connection with any other people in India. Similar cases seem to be found in many tribes entirely isolated who exist in portions of the mountain ranges.

A SECOND EXPEDITION THROUGH THE BARREN LANDS OF NORTHERN CANADA.*

By J. BURR TYRRELL, M.A., B.Sc., F.R.S.

TOWARDS the end of May, 1894, the writer was instructed by the Director of the Geological Survey of Canada to continue the exploration of the country north-west of Hudson Bay, beginning at Reindeer lake, and coming out at some point on the coast of the bay. In previous years it had been learned that the Chippewyan Indians regularly used a canoe route from Reindeer lake northward up Ice river, and across many lakes and portages, to the head of Kazan river, which flowed northward or eastward. The Telzoa river, lying further west, had been found in 1893 to flow into the head of Chesterfield inlet, and therefore the mouth of the Kazan river could not be further north than Chesterfield inlet. Several Indians had assured the writer that, although they had never descended the river, they knew from report that it flowed into Hudson Bay a long way south of the mouth of the Telzoa river, and that it was a fine large stream without heavy falls or rapids, and that it would not take more than six days to descend it from the source to the sea. These statements, taken together with the map made by Samuel Hearne in 1772, seemed to favour the belief that

* Published by permission of the Director of the Geological Survey of Canada. Map, p. 496.

Kazan river flowed into the west coast of Hudson Bay somewhere north of Cape Eskimo, and was not improbably the river flowing into the bottom of Neville's Bay, which was seen in the fall of 1893. Although the season was rather too far advanced, it was therefore decided to try the descent of the Kazan river. All the statements made by the Indians from report were found to be incorrect and misleading, for the river is now known to be obstructed by one or two falls and many swift and dangerous rapids, and to flow into the south side of Baker lake in Chesterfield inlet, not far from the mouth of the Telzoa river.

Early in June Mr. Munro-Ferguson and the writer proceeded by rail to Winnipeg, and thence to Selkirk, the port near the south end of Lake Winnipeg, where three native canoe-men were hired and the bulk of the supplies were obtained for the season. A supply of provisions had also previously been purchased and sent up to Fort Churchill, on Hudson Bay, by the Hudson's Bay Company's annual steamer *Eric*, to serve on the return trip, or in the event of our being delayed at Churchill.

On June 16 the party embarked in a steamer at Selkirk, but it was the 22nd before it reached Grand rapids, at the mouth of the Saskachewan river. Here the canoes were put in the water for the first time, and two additional men were employed to accompany us in a birch-bark canoe, loaded with supplies, up the Saskachewan river for 200 miles, as far as Cumberland house, which was reached on July 2. On the way we were delayed for two days by a heavy storm, and our progress was greatly retarded by the rapid current of the river, which at that season of the year was at extreme high water. Very little could be seen while ascending this river but the wide marsh extending out on both sides, except at "The Pas," where the trading-store and mission were found to be built on a diffuse morainic ridge, probably a north-westward continuation of the moraine north of Lake Winnipegosis, which, towards the end of the glacial period, represented the front of the great Keewatin glacier that travelled southward from a centre of dispersion in the country towards which we were journeying.

Unfortunately, some of our provisions had been lost by the upsetting of one of our canoes in Calico rapid, below Cedar lake, but we were able to replace most of them here. An additional Indian was engaged as steersman for one of the canoes, and two others were employed to accompany us in the birch-bark canoe as far as Du Brochet trading store, at the north end of Reindeer lake, from which place they were to return. The two men employed at Grand rapids returned from here.

On July 4, the party, still in one birch-bark and two cedar canoes, left the Saskachewan river at Cumberland, and turned northward up Sturgeon-weir river, continuing to travel through a low, flat country thickly wooded with spruce and poplar, and underlaid by horizontal white limestone, generally rather poor in fossil remains; but enough

were found to show that the rocks are of Cambro-Silurian (Trenton) age, similar to those near the mouth of Red river. On the north side of Beaver lake, the horizontal Palæozoic limestone was left behind, and a country was entered which consisted of rocky hills of Laurentian granite and gneiss. We continued the ascent of Sturgeon-weir river, through several lakes, connected by stiff rapids, past which the goods were carried over the rocks. At one of these rapids is a beautiful series of pre- (or inter-) glacial pot-holes, worn out of the solid granite, where there appears to have been a heavy rapid on a large stream flowing southward. It would seem probable that Deer river continued to flow southward at that time, and the outlet towards the east, of both it and Churchill river, is of more modern date.

From the head of the Sturgeon-weir river the goods and canoes were carried for 330 yards across Frog portage to Churchill river, whose waters flow along the north side of a narrow ledge of rock 10 or 12 feet higher than the source of Sturgeon-weir river. In times of flood the water from the former stream pours over the rocky ridge into the latter.

Below Frog portage Churchill river is descended for a few miles, passing some conspicuous sandy eskers on the north bank, and then, without leaving the same great valley, the ascent of Reindeer river is begun. The river is deep and wide, often without much current, like a long narrow lake, with but five rapids in its whole course, past four of which the canoes are carried for short distances.

Reindeer river flows southward from the south end of Reindeer lake. For five days we skirted the eastern shore of this beautifully clear lake, winding among its almost innumerable rocky islands, until, on July 18, we reached its northern end, where the Hudson's Bay Company have their most northerly trading post in this district, and the Roman Catholic Church has a well-appointed mission. Here the Chippewyan Indians visit from the surrounding country two or three times a year to barter their furs and deer-meat for ammunition and clothing, and to perform their devotional exercises. About Christmas-time a few Eskimo come in from the far north, bringing robes and furs to trade for ammunition and tobacco, but throughout the remainder of the year the trader and the missionary are almost alone.

At this place, which is usually called "Du Brochet Post," the two Indians whom we had engaged at Cumberland were sent back in the birch-bark canoe, and two Chippewyan Indians were persuaded to promise to accompany us northward in their own canoe, as far as Ennadai lake, on the Kazan river, with the double object of acting as guides and helping us to carry our provisions.

Up to the time of our arrival at this place we had travelled in canoes for 650 miles, through country which was already to some extent known, at least geographically, and we had, therefore, hurried forward towards the unknown country ahead of us, devoting all the time caused by

necessary delays to the study of the adjoining rocks, and not to the making of any regular survey.

At Du Brochet post observations were taken for latitude and the variation of the compass, and on the afternoon of July 20 we left this last remote abode of civilized man, and began the ascent of Ice river, measuring the quiet stretches with a Massey's floating boat-log, estimating the stretches of running water, taking the bearings with a prismatic compass, using a solar compass occasionally to correct the variation, and taking the latitude daily, if possible, with a Hadley's sextant of seven-inch radius, and a mercurial artificial horizon. The river was ascended in a general northerly direction for 121 miles, to a point on its east bank, where the Indians usually leave it and carry their canoes over a steep-sided sandy ridge for a third of a mile to a small lake. On the afternoon of July 27 we left Ice river, and carried our canoes, provisions, and supplies across this portage, which proved to be the first of a long chain, forty-four in number, with an average length of 544 paces, or a total length of about 13 miles. The paths were usually over rough, irregular masses of broken rock, and as a rule it was necessary to make four trips over each portage to carry the canoes and their loads. Since leaving Reindeer lake the country had been an irregularly undulating till-covered plain, wooded with small black spruce and larch; but the first portage from Ice river was over a long sandy esker, whose slopes were wooded with tall white spruce and canoe birch. The canoe route passes through several small lakes lying to the east of this esker, and then crosses a very stony moraine that has turned the Ice river abruptly southward, after it has flowed north-eastward from Wollaston lake, and separates its waters from those flowing northward into Thlewiaza river. Blue lake, just north of the moraine, and at the head of the latter stream, is about 50 feet lower than the water at the bend of Ice river, 2 miles to the south.

An esker continues northward along the west side of Blue lake. It is wooded with tall white spruce, and on its warm south-eastern slope is a grove of small poplars (*P. tremuloides*), an apparently isolated occurrence of this tree in the midst of the surrounding coniferous forest. The route descends the stream through Thanout and Theitaga lakes, by the former of which an Indian chief named Red Head has a small but substantial log house in which he spends the winter. From Theitaga lake the Thlewiaza (or Little Fish) river was said to flow north-eastward to *Nov-el-tin*, or *Island-lying* lake, beyond which it flows, at first down a series of heavy rapids, and then with quieter water, until it empties into the west coast of Hudson Bay between Egg Island and Cape Eskimo.

The route to Kasba lake leaves Theitaga lake, and ascends a small tributary coming from the north-west. Here, about the end of July, in a grove of low birches, we saw a flock of the beautiful Bohemian wax-

wings (*Ampelis garrulus*) fluttering about among the leafy branches in the long cool evening. They were clearly on their breeding-ground, but the need of pushing on with all possible haste prevented us from searching for their nests. We ascended this brook for several days, hauling or carrying the canoes; then we crossed a low divide between small lakes, and on the evening of August 5 pitched our camp on the sandy shore of Kasba lake. Behind us granite hills rose to heights of more than 400 feet, while long lanes of water stretched north and south between the rocky stony ridges, with belts of dark green forest skirting the bases of the adjoining hills, or covering the lowlands.

After suffering a delay of a day and a half by a storm, we were able to launch our canoes on Kasba lake, and start northward over its clear blue water. A survey was made of its eastern shore, which consisted of sand or boulders, while the hills behind rose in long rich grassy slopes. Kazan river flows from the east side of Kasba lake, and rushes for 30 miles in a shallow channel down a long regular till-covered slope to the south end of Ennaida lake, where, in a grove of tall white spruce, the Indians regularly pitch their camp in autumn to await the reindeer as they cross the water in their migration southward. This was the most northerly grove of white spruce noticed on Kazan river. Our Chippewyan guides had now done all that they had originally agreed to do, by taking us down the Kazan river as far as they had any knowledge of the country. We had reached the northern confines of their hunting-grounds, and the great treeless wastes to the north were supposed to be thickly peopled with unfriendly Eskimos, who would almost certainly destroy them.

Near this white spruce grove, therefore, we paid these kindly Indians for their services, and paddled northward over the cool surface of Ennaida lake without native guidance of any kind. Our party now consisted of Mr. R. Munro-Ferguson and the writer, with four canoe-men, in two cedar canoes. An unknown river, with many broad lakes, lay between us and some point on the west coast of Hudson Bay; beyond which was the inhospitable treeless shore of the bay itself.

During the day the wooded country was left behind, and at night camp was pitched on the Barren Lands, where a wet boggy flat extended back from the shore of the lake. The next day one of the storms that almost unceasingly sweep across these open wet plains of the Barren Lands broke over us, and drove us into camp under a high hill of gneiss on the east side of the lake, where a little rill, trickling down among the stones, supported a few low dwarf spruce and larches.

The storm continued to rage for three days, with showers of snow and rain, and prevented us from putting our canoes in the water.

Up to this time we had not seen any deer, and had not been able to shoot anything for our support; but on August 14, after the storm was over, we crossed to the west side of Ennaida lake, and there, for the first time during the season, we fell in with Barren Ground caribou

travelling southward in large numbers. The deer were rather difficult to approach in the open treeless country, but several were soon shot, and their meat spread out to dry in the sun and wind, so that we might have a supply of dried meat to carry with us.

Kazan river flows from the extreme north end of Ennadai lake, and, resuming its rapid current, it rushes in a shallow channel amid stony morainic hills, past the last considerable grove of small timber, and just below some sandy kame-like ridges opens into a small lake, on whose eastern bank Kopannak and several other Eskimo, with their families, were living in two large deerskin tents. On our approach, the inhabitants left their work of skinning and dressing deer, and fled away to the top of the stony hill to the west. After a while they became convinced of our friendly intentions, and slowly returned.

We now felt very keenly the need of an Eskimo interpreter, for they could not understand our languages, and none of us could speak a word of theirs. However, after considerable difficulty, one of the Eskimos was induced to draw a rough map of the remainder of the river, which appeared to show that it flowed through several large lakes, and then emptied into the west side of Hudson Bay south of Marble island. Delighted with this information, and accompanied by three Eskimos in their deerskin kyacks, we continued down the river, through the cold pelting rain, to the tent of a bald old man named Hai-kuakuak, where we camped for the night.

On the following day the same Eskimo accompanied us, attracted by the small presents of needles, tobacco, etc., that we were able to make to them, and by the novel sight of white men journeying through their country, which spreads out on both sides as wide, undulating, grass-covered plains. Two Eskimo villages were passed, and towards evening we reached a third, consisting of two tents inhabited by Hallo, Ahyout, Kakkuk, and another, with their families, or about sixteen persons in all. We were now at an elevation of about 1000 feet above sea-level, and we knew that we had to descend that distance before reaching Hudson Bay, so that it was probable that many rapids and falls were still ahead of us, while much time might be lost in searching our way through the irregular lakes. It was therefore necessary, if the journey was to be continued at this late season of the year, that a guide should be secured. At length, after a long parley, with a promise of a gun for himself, and tobacco, beads, and knives for many of his relations, we induced Kakkuk to accompany us. His father, Ahyout, at once volunteered to go a short distance with his son. The next day, when the women were left well behind, Ahyout informed us that he would accompany us to the sea, at the same time making the very modest request that we would keep him supplied with sufficient tobacco to smoke on the journey.

With our two Eskimo guides, we continued across small lakes and

down steep rapids, the sides of which were of rounded boulders packed into a solid wall of dry masonry by the shoving of the heavy ice in spring. Almost every day we passed two or three Eskimo villages, where we were welcomed kindly, and where our presents of tobacco were received with shouts of joy. With needles, thimbles, beads, etc., we purchased deerskin clothing to protect us against the severity of the rapidly approaching winter.

On a large lake, called by the Eskimo Angikuni (or Big) lake, we were again delayed for three days on an island by a heavy storm. A day or two afterwards we reached Pasamut's village, at the foot of a series of heavy rapids and falls, where about sixty-five Eskimo were living in seven tents. Here we learned for the first time that the Kazan river, which we were descending, empties into Baker lake or Chesterfield inlet, and not into Hudson Bay direct, as we had previously been led to suppose. To follow it to its mouth, and then to coast down the shore of Hudson Bay, would be quite impossible at this late season of the year. After making diligent inquiries, however, we learned that it would be possible to leave this river below, and, by a chain of long portages, reach the head of another river that flowed into Hudson Bay opposite Walrus or Seahorse islands. In spite of the protestations of our Eskimo guides, who wished to reach salt water by the shortest way, we at once determined on trying this route.

On August 30 and 31 we crossed Haicoligua or Tath-kyed lake, just above which, on a sandy flat on the west bank of the river, is a small isolated grove of larch trees. During the previous week no wood had been seen except a few willows and low dwarf birches (*Betula nana*), and a very few black spruces, here reduced to a foot or two in height. Tath-kyed lake is generally surrounded by a wall of boulders, behind which rise rather high grassy hills, probably underlain by Laurentian gneiss, covered with a thin coating of till. Many of the boulders are derived from the red Keewenawan sandstones and quartz porphyries to the north and north-west.

A short distance down the rapid river below Tath-kyed lake we came to an Eskimo village, where six additional men were hired to help us across the portages, one of them agreeing to accompany us to the sea, as our guides did not know the way any farther.

On September 1 we left the Kazan river, and started to carry our canoes and stuff eastward over a chain of twelve long meadow portages. The day was beautifully fine, and gave us an excellent opportunity of taking observations for latitude and variation of the compass. The point where we left Kazan river was found to be in north latitude 63° 7′, with a variation of the compass of 20° 45′ east. These observations were particularly fortunate, as for the next twenty-three days the weather was constantly stormy or overcast, giving us no opportunities of correcting our positions by astronomical observations.

For five days the men toiled over the level wet grassy portages, until at length we reached the shore of a lake, which, with the river flowing from it into Hudson Bay, I have named Ferguson lake and river, after my friend Mr. R. Munro-Ferguson, who was my constant companion during the expedition. He was the first white man who, in an unofficial capacity, inspired by the true spirit of adventure, descended this remote northern river.

The shores of Ferguson lake are rocky, composed of bare hills of trap, or dark green Huronian (?) schist. Grassy terraces of sand and gravel rise up the sides of the hills, indicating old marine shore-lines, when, at the close of the Glacial epoch, the land was depressed between 400 and 500 feet below its present level. The rocky country continued down the river to Kaminnriak lake, a large body of clear water extending an unknown distance north of our line of route. The rock now disappears for a time, and the shores of this lake spread out into wide, undulating, grassy, till-covered plains. Two more small lakes lay in the course of the stream on this till-covered plain, and then Ferguson river again entered a country of bare, rounded, dark green massive or schistose rocks that extended from this point eastward to the shore of Hudson Bay.

Up to this time there had been very little difficulty in keeping the party supplied with fresh deer-meat, but in the rocky country no deer were to be seen, and from this time forward we were obliged to live on dried deer-meat and the residue of imported provisions that we were carrying with us. The constant storms now began to increase in violence, with heavy falls of snow, which covered the whole country in its white winter mantle, and caused us long continued delays, so that we were unable to reach the mouth of Ferguson river before September 18, only three days earlier than we had been beset by storms on an adjoining cape in 1893, at which time winter had permanently set in. Our Eskimo guides were now paid off, and we parted with them with much regret, for during the month that they had been with us we had become excellent friends.

In 1893, from the time of our arrival here, it had taken us twenty-eight days to reach Fort Churchill, and should we this year experience similar weather, a very unpleasant part of our journey was evidently still in store for us. But the day was calm, and while our three Eskimo friends turned back up the river, we paddled out with the tide over the salt water of Hudson Bay, camping for the night on a bold rocky point a few miles south of Sir Bibby island. For the next two days a stiff south wind, with heavy flurries of snow, greatly retarded our progress; but after dark on the second evening, when the tide was up, we landed on the low flat shore a few miles north of our cache of last year. The next morning was cold and cloudy, with a south-east wind. Before the tide rose, the writer walked southward along the shore, while Mr. Munro-Ferguson brought on the canoes as soon as they could be

launched. It was impossible to reach the cache before the tide ebbed, and it was therefore necessary to land and remain one or perhaps several days, or to get into the canoes and travel on, going out with the tide. As our canoes were now loaded with all they could carry on the open sea, it was deemed highly inadvisable to risk the loss of even a day at this late season of the year, 300 miles from Churchill, with the rigours of a subarctic winter closing around us, on an uninhabited barren coast, with no fuel but three pints of alcohol.

For the next few days the weather continued passable; but the tide, which here runs about 15 feet, and retreats at ebb for several miles, was at its height near midday and midnight, and we were unable to travel for more than two or three hours near the high day tide, for the many boulders scattered over the shore made travel at night dangerous or impossible.

The hills on the shore north of Cape Eskimo are rough, stony, morainic ridges, while Cape Eskimo itself is a long, narrow, sandy esker extending eastward towards the bay. South of Cape Eskimo is another similar esker point, behind which are some rough hills, probably morainic in character. The day after we passed Cape Eskimo we were travelling along a low flat shore. The tide was at its height shortly before noon; but we continued on our course until after two o'clock, when, finding that the tide was ebbing very fast, we turned towards shore, but were unable to get within 1½ mile of land, when we went aground on the sand and boulders. The canoes were then carried for more than a mile to a small island below spring-tide level, where camp was pitched, trusting that an east wind would start up in the night and drive the rising tide over. The water around us was found to be fresh, and we soon saw that we were camped in one of the mouths of a river, probably of considerable size. The night was starry and cold, and an observation showed that we were in north latitude 60° 49′ 45″. Before dark the tide had receded so far that the sea could not be seen from our camp. The next morning the water was frozen around the tents. We carried the canoes out a third of a mile to meet the incoming tide, and were afloat an hour and a half before the tide was at its height. For the next two days we travelled in a similar manner, carrying our canoes and stuff to and from the shore. On the third day, September 26, we caught the high tide in the early morning, and went out with it. Just as the day broke a heavy fog set in, and hung over us all morning, covering the canoes and everything in them thickly with frost crystals. Many times the canoes were in danger of destruction from cakes of floating ice, or from being carried over boulders by the swiftly ebbing tide. The first drifted tree-trunks were found on the shore in latitude 60° 3′ 30″, probably not far from the mouth of Thlewiaza or Big river, and from that time firewood was quite plentiful along the shore.

The shore is almost everywhere low, with occasional bosses of granite or gneiss rising here and there above the water.

On October 1 we struck across the mouth of Button's bay, and at noon rounded the outer Churchill beacon. The tide was rushing out of the gap at the mouth of the harbour, and we were therefore unable to enter it until the tide had turned. About four o'clock we passed Old Fort Prince of Wales, and entered the harbour, and, just as night set in, we landed on the rocky point below the mission at Churchill. Here we were met by the Rev. Jos. Lofthouse, Captain Hawes, and Mr. Alston, and extended a hearty welcome. It was impossible to proceed further in canoes this year, and, as the rivers and larger lakes were not yet frozen, it was equally impossible to travel overland. We therefore accepted the very kind invitations of both the missionary and the fur-traders to stay with them during our necessary detention at Churchill. Our stay here not only gave us an opportunity of examining closely the geology of the district, but we were able to collect considerable information as to the length of time that the Churchill harbour is open for navigation. We also obtained from an Eskimo named Powow, and two Chippewyan Indians, many sketches, showing the geography of the country west of Hudson Bay.

In the winter of 1893, we had returned southward from Churchill by following the ordinary trade route along near the shore of Hudson Bay to York Factory, and thence by Oxford to Norway House. This year we decided to explore a new route, going directly from Churchill across country to Split lake, on the Nelson river, and thence by Cross lake to Norway House, a route especially interesting as being near the proposed line of the Hudson Bay railway. A team of five dogs was purchased from some Chippewyan Indians, who came in to trade at the store, and two Cree Indians were hired, with their own team of three dogs, to guide us across the country. The officer in charge for the Hudson Bay Company also agreed to send a dog-team with us to assist us in carrying our provisions during the first six days of our journey. The principal part of our load consisted of 1000 lbs. of provisions, 600 lbs. of which was for the dogs, and 400 lbs. for the men.

At daybreak on November 28 we bade good-bye to our kind friends, and started up Churchill river on our long tramp homeward. That day we walked without snowshoes on the ice, but early next day we left the river to the west of us, and, tying on our snowshoes, started across an almost treeless snow-covered plain, through which Deer river winds in a very sinuous channel. For five days we travelled across an almost level though gently rising plain, which is evidently very wet and boggy in summer. A rather steep escarpment, about 100 feet in height, rises to a total height of about 600 feet above the sea along the south-west side of this great plain, indicating the highest old marine beach, where the land stood nearly 600 feet below its present level. The crest of

the escarpment was lumpy, and probably consisted of sand-dunes, but the snow was too deep to allow us anywhere to see the ground.

The sled from Churchill turned back at this ridge, which is here about a day's journey within the limits of the continuous forest. The country south-west of the escarpment was lumpy and irregular, apparently underlain by till, and the snow was about 3 feet deep and very soft, so that the dogs had often more than they could do to haul the sledges even a few miles a day. We crossed some small lakes at the head of Owl river, and on December 8 reached a small tributary of Nelson river.

On December 12 we reached Musogetaiwi lake, where we saw the first rock in place since we left Churchill, the intervening country being evidently largely covered with drift. The next afternoon we reached Gull lake, on Nelson river, and from thence we ascended on the ice of the river to the trading port at Split lake, where we arrived on the morning of December 15. Here we obtained one fresh team of dogs, and then continued our tramp southward, reaching Norway House after dark on Christmas Eve, where four days were spent giving men and dogs a much-needed rest.

The remainder of the journey was down Lake Winnipeg to Selkirk, where we arrived on the evening of January 7, 1895, after an absence of six months and twenty-two days, during which time we had travelled 2900 miles, 1750 of which were in canoes, and 725 on snowshoes.

Note on Mr. J. B. Tyrrell's Map.—The work shown on this map helps to fill in the space between Mr. Tyrrell's two former journeys of 1892–93, an account of which appeared in the *Geographical Journal*, vol. iv. p. 437. Observations were taken at Du Brochet with the sextant and artificial horizon for latitude and the variation of compass. During the journey bearings were taken with the prismatic compass, a solar compass being used occasionally to correct the variation. When possible the latitude was observed daily, and a Massey's floating boat-log was employed to estimate the stretches of running water.

RECENT BOOKS ON THE UNITED STATES.

By ÉLISÉE RECLUS.

It is said that the architect of the new library of Congress at Washington, warned by the masses of literature packed away in the cellars of the existing library, planned the new buildings with the purpose of making room for at least five million volumes. Nor is the estimate excessive, for the interminable stream of printed matter, including periodicals by the cart-load every day, threatens to fill the largest halls to overflowing. In this flood geography has a large share, and the special literature of the United States is increased every week by new works, good, commonplace, and valueless. Books of the first class are rare enough—

we are inclined to say fortunately, because the critic may find time to read them all and note their best points. The present article is concerned with the three most important works on the geography of the United States which have appeared in recent months.

The volume by Mr. J. D. Whitney * is merely an appendix to his earlier book, which was originally written for the *Encyclopædia Britannica*, but only published there in part, on account of its length. Being complementary to the previous work, this appendix naturally lacks artistic unity of design; but it is of great interest, notwithstanding, for it deals with the statistics of the last census, and especially because of the space given to the question of irrigation in the Great West.

It is well known that during recent years the extension of irrigation works has won great stretches of good agricultural land from the arid deserts of the western plateaux, and the full discussion of the question, fortified by detailed statistics, forms one of the best features of Mr. Whitney's book. Yet it must not be forgotten that irrigation schemes have given birth to many speculative companies, and that many fraudulent transactions on the Stock Exchange have been preceded by reports of irrigation works which, if not absolutely untrue, were at least greatly exaggerated. In the thinly peopled region of those arid lands, it is easier than in most places to start false reports for the use of distant shareholders. Companies were quickly formed, and disappeared no less rapidly, but out of the many vaunted enterprises some at least were sound, as the scattered towns growing up in the ancient solitudes sufficiently testify.

Artesian wells appear to have been remarkably successful in different parts of Texas; for example, those of Waco, where in 1891 nine wells discharged a total of 850,000 gallons per day. This water, coming from a depth of 1607 to 1896 feet, has a temperature of from 97° to 103° Fahr., and, although containing sulphates and carbonates in solution, is said to be "very pure and without appreciable taste." Near the town of Fort Worth artesian water wells up in abundance, sufficient to furnish a water-supply for a city of a million inhabitants. This water, too, according to Professor Hill, is "clear as a diamond and pure as melted snow," although a good chemical analysis would be more satisfying than the somewhat ambiguous metaphor. I must add that the "tall talk" natural to Americans, and especially to Western Americans, does not abandon them in discussing questions of subterranean hydrology. According to many of them, the melting snows of the Rocky Mountains, aided by the slight rainfall of the Great Plains, suffice to maintain a small ocean streaming under the superficial strata as "a mighty underflow" towards the Gulf of Mexico. Under every river, the Plate, the Republican, the Arkansas, they affirm that another and greater river

* 'The United States,' Supplement I.—Population, Immigration, Irrigation.

exists, which the farmers of the future will probably be able to lead back to the surface. Mr. Whitney thinks—and with good reason, as we believe—that such hopes are in great part chimerical. Enterprises infinitely easier have only been executed imperfectly or remain mere projects; such, for example, as the 147 reservoirs which the members of the Irrigation Survey have planned in California and the western States. These would together have an area of 166,000 acres, and could store enough water to irrigate 1,900,000 acres of land;* but these vast works have not yet been undertaken. On the Upper Mississippi, several of the lakes and alluvial valleys which rise in successive tiers have been transformed by dams into reservoirs for the winter and spring floods, still it does not appear that these efforts towards regulating the river and maintaining its flow in dry weather have had appreciable results; besides, the lumberers who float timber down the Mississippi complain greatly that the regulated river has no longer a sufficiently rapid current at the time when it is most wanted for their work.

The two volumes entitled 'The United States of America,' and edited by Professor N. S. Shaler, form rather an encyclopædia of North America than a methodical work presenting the various questions dealt with in their proper place and in due proportion. There is not even a consistent editorial plan. The editor has put together several chapters which are not always in logical order, and then left to others the treatment of special questions, or of matters which seemed to him of secondary interest. There are even some chapters which would be out of place in any but a purely financial work, as, for example, that on "The place of corporate action in our civilization." We regret, also, that the authors have introduced into a work of which science and art should be the principal objects, illustrations of banks, factories, workshops, locomotives, steamers, sheds. These unattractive pictures abound, and the work would have gained much by their absence. It would have gained, also, if it were not embellished by maps and pictures taken from other books, from which the titles and the authors' names have been removed. Nothing could have been easier, in the scientific surroundings in which the editor lives, than to prepare original maps and illustrations.

The most important chapter in Professor Shaler's part of the work seems to us to be that devoted to marsh lands. Almost all the lakes which formerly occupied hollows in the primitive glacial deposits have been gradually filled up. Excepting only those lakes the waves of which are strong enough to prevent the growth of sphagnum and other

* Report III. in Report of the Secretary of the Interior (52 Cong. 1st Session, Ex. Doc. 1, Part 5), containing Twelfth Report of the U.S. Geological Survey. Part II. Irrigation. 1892.

peat-forming plants, we find that the lateral creeks of such basins are diminishing. It may often be demonstrated that masses of muddy moss encroach on the water year by year as a sort of floating quay. Various species of rushes, water-lilies, and reeds grow thickly sufficiently far in front of the invading sphagnum to check the force of wind and waves, and so facilitate the growth of peat, which steadily advances. Seeds and broken vegetable matter fall to the bottom, which is gradually raised by the accumulation, and affords soil for the vanguard of growing vegetation. The lacustrine peat-beds of North America probably extend in cultivable regions to an area of at least 40,000 square miles, and may be entirely reclaimed by means of drainage and improvement. The important cranberry industry has lately developed on these old fresh-water marsh-lands. For this purpose the upper layer of peat is removed, and a bed of sand about 6 inches deep is spread in its place. The cranberry cuttings are planted at intervals of one or two feet, and in a few months they cover the soil with a continuous mantle of vegetation.

Like Mr. Whitney, Professor Shaler has a good deal to say about the effects of irrigation on agriculture in the Great West, and here he perhaps allows himself to be led astray by hopes which are not likely to be realized. It seems scarcely probable that, even counting the produce of the mines, "in twenty years from the present time the aggregate of commercial values which will be thus won from the great American desert will be as large as that obtained in any equal area of the continent."

We must also take exception to the author's statements about the French Canadians. Twice, on page 126 and on page 220, he asserts that the French Canadian race has a considerable mixture of Indian blood. This is not the case, as a very learned writer has clearly proved.* No doubt the French immigrants who first penetrated into the forests of the interior took native wives, but they allowed their children to remain with the mother's tribe, even when they did not lapse into savagery themselves. The native Indians were crossed with French blood, and in many places gave birth to the remarkable ethnic groups of "Bois-brûlés," whose assistance in opening up the Great West has been so important. But the French-Canadian colonists, as a whole, married amongst their own people. During the period from 1608 to 1663, young girls from twelve to sixteen years of age were recruited in all the parishes of France, and when the white population of Canada rose to 2500, the equilibrium of the sexes was almost established. Only seven marriages of Frenchmen with Huronian or Algonquian wives are recorded.

The attentive reader of Professor Shaler's work will find many

* Benjamin Sulte, 'Prétendue origine des Canadiens-Français.'

controvertible points, but he will, perhaps, be inclined to find most serious fault with the author because of a certain want of magnanimity in the treatment of high questions of political morality. In such questions one ought not to be satisfied with dull and trivial phrases, so wanting in relief that the true meaning of them must be sought for with an effort.

The penultimate chapter at least, on "The place of the individual in American society," prepared by Mr. Lyman Abbott, leaves nothing to be desired as a sincere and bold discussion of the subject. This fine chapter is thoroughly impartial in its tone, and quite free from the boasting spirit so natural in a people which has made such vast and rapid strides in material prosperity.

The second edition of the second volume of Professor Friedrich Ratzel's book on the United States * is a work of the first order, admirably sustaining that high reputation which all his earlier works have won for their author. It is far from being a reprint of the first edition; originally prepared with scrupulous care, it has been corrected in the most conscientious manner. The statistics have, of course, been completely revised; but, besides that, the author has throughout given increased attention to the importance of the study of environment as well as race. He treats his subject in a strictly logical order; perhaps he has made it a little too much of a text-book, as if it were prepared to assist students to pass an examination, and the style is a little dull and colourless, not always even as clear as one could wish. Naturally, all the maps in the text and the Kultur-Karte at the end of the volume are specially engraved from original draughts. Taken as a whole, Ratzel's work must be considered a classic, perhaps the best and most complete treatise on the United States in any language.

Without taking notice of many small details which might be touched upon, we limit ourselves to calling attention to pages 172 and 173, in which the author speaks of the feeling for nature. He very rightly rebukes de Tocqueville for having denied the deep love and filial poetic feeling which most American authors display for their lakes, rivers, forests, mountains, and the thousand charms of the land they dwell on and the air they breathe. He cites the names of Cooper, Hawthorne, Bryant, Lowell, and above all that of the incomparable Thoreau. He might have mentioned equally well the delightful towns, the streets of which are married to beautiful gardens, flowery turf, and wooded fields. But if on one side he recognizes in the poets their deep respect for the beauties of nature, should he not, on the other, have referred to those industrial and business men—personages who bulk so largely in American

* Friedrich Ratzel, 'Politische und wirthschaftliche Geographie der Vereinigten Staaten von Amerika.'

society—whose contempt for nature is complete? There are few countries which are made hideous with a lighter heart than America. Its mines, factories, railway stations, make one fear that the nation is suffering from a barbaric suppression of the æsthetic sense analogous to the exhaustion of the soil. One recalls with a kind of horror some Oilville or Ironopolis, with its maze of intercrossing rails, its mounds of coal and slag, hideous buildings, derricks, sheds, its grimy hotels and filthy drinking-shops garnished with dingy banners.

Niagara City perhaps inspires the most painful feelings of the contrast between the fine sentiment for nature cherished by the poets, and the absolute contempt for beauty displayed by the mill-owners. On one side, fair woods and lawns respectfully surrounding the cataract; on the other, a frightful crowd of breweries and factories monopolizing the cliff and defiling it with their disgusting outflow.

A JOURNEY IN PERSIAN KURDISTAN.

By WALTER B. HARRIS.

I LEFT Tabriz on May 12 of this year (1895), and, skirting between the slopes of Mount Sahand and the shores of Lake Urumia, passed the famous "marble springs" on the 14th, and some few hours later arrived at Maragha. This town possesses about 18,000 inhabitants, and was once one of the many residences of Hulaku, the Mongol chief (died 1265 A.D.); but I failed to detect the remains of the observatory of Nasr ed-Din, said to have been situated on a hill near. The tomb of one of Hulaku's wives was shown to me. It is a high octagonal brick tower with some very delicate and beautiful work in faïence, and an inscription in blue tiles encircles the summit just below the dome. The building is elevated on a stone foundation. Within is a large stone chamber with well-faced walls. The viceroy and heir apparent, the Vali-aht, tried to throw down the tower in his search for treasure when he visited the spot some few years ago, but the skill of his workmen failed to do more than barely move one stone.

From Maragha I proceeded to Suj-bulak, *viâ* Miandab, which mud-built town is even now almost entirely in ruins owing to the Kurdish invasion in 1880 under Obeidullah. Suj-bulak is a bright, picturesque little town almost entirely populated by Kurds, whose gorgeous clothing and pleasant manner add a charm to the place. Here I first obtained an insight into the kindly hospitality I was to receive all through Kurdistan. I may add that I was not armed with any letters or official papers of any sort from the Persian Government, and this, I venture to think, aided me not a little.

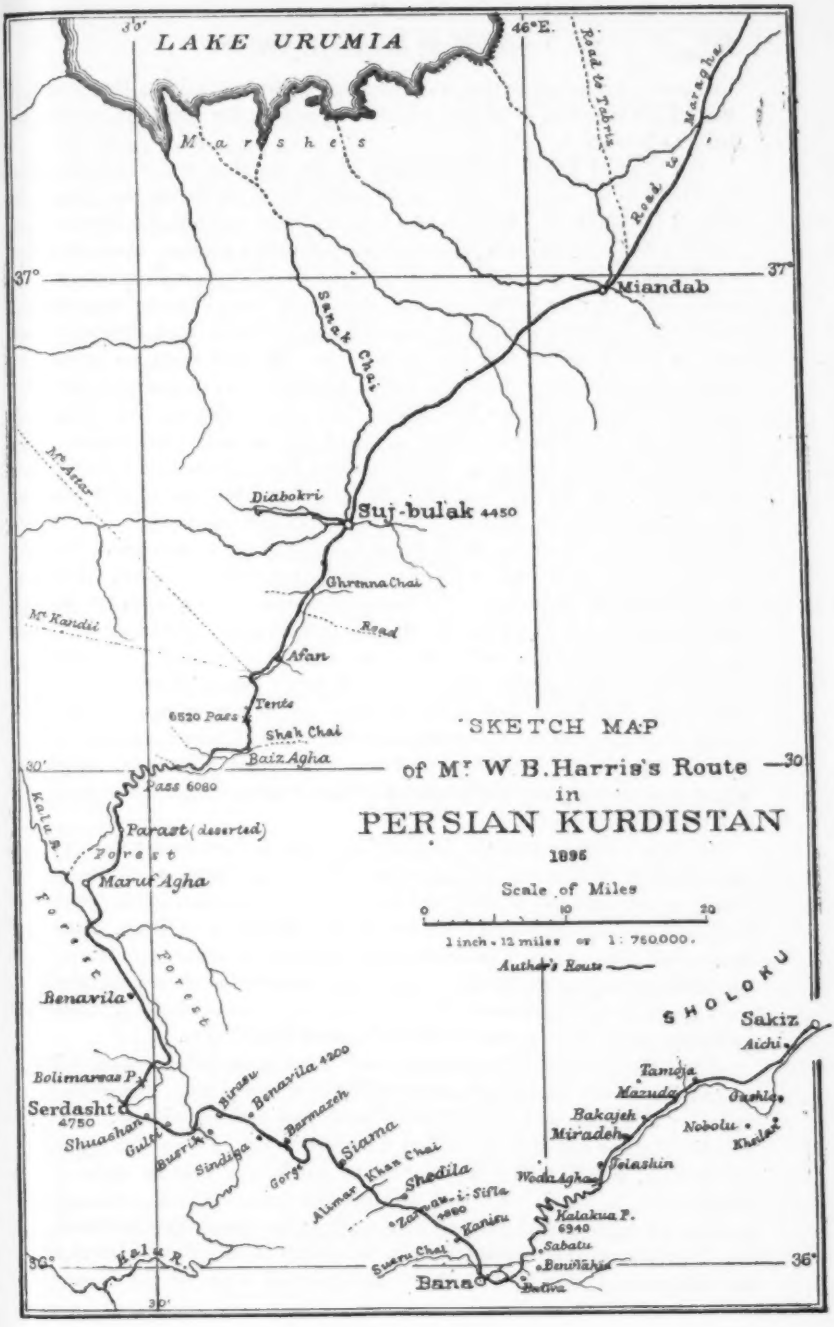
After having made an excursion to the house of a Kurdish chief in the neighbourhood, I left Suj-bulak, with a Kurdish guide and my

Turki and Arab servants, for Serdasht on May 20. Instead of following the caravan road, I struck straight across the mountains, for the purpose of seeing the Kurds in their summer quarters. The road for the first day offered no very distinctive features, passing through green pasture land, and scarcely a village to be seen. Towards nightfall we began to ascend, and spent the night with some Kurdish shepherds in their tents at an altitude of about 6000 feet above the sea-level.

Early next morning we crossed this ridge of hills at an altitude of 6520 feet, and, descending by a winding gorge, reached the Sheh Chai, where we breakfasted in the tent of Baïz Agha, a Kurdish chief, the nephew of the celebrated Gader Agha, head of the Mangur tribe. In the afternoon another high ridge of grass-covered hills was crossed, here and there rocky precipices being visible. The ridge was crossed at an altitude of 6080 feet above the sea-level.

A magnificent panorama of the Kalu valley opened out from here, range after range of hills both sides of the river covered in forest, with a background of the high snow-peaks that mark the frontier between Turkish and Persian territory. Descending by a winding path through lordly forest country—principally the Kurdistan oak—we passed the now deserted village of Parast, and spent an hour later on in the hospitable house of Maruf Agha, another chieftain. I should have stated before that I had none but the scantiest luggage, and depended entirely upon the hospitality of the Kurds for food and lodging.

The Kalu river, marked as Kalvé in some maps, flows at this spot nearly north and south. The ford was difficult, but with the aid of half a dozen volunteers and swimming, we got across. Keeping to the right bank of the river, the night was spent at Benavila, a most picturesque and hospitable village in a lovely gorge of forest trees. Music and dancing were got up for my entertainment, together with a big feast. The following day (May 22) we travelled for an hour and a half along the bank of the river, now through cultivated land, and again through jungle of trees and yellow roses, and then ascended by the Bolimarsas pass to Serdasht, which was reached before noon. The town is a small place, situated high above the right (west) bank of the river, commanding a magnificent view of the valley, forest, and peaks beyond. So overgrown are the roofs of the houses with grass, that until one is almost within the streets one does not perceive a single habitation. The population of Serdasht probably does not number more than two thousand people—all Kurds. From this spot a road runs to Suleimaniyeh, in Turkish territory, whence there is a caravan road to Baghdad; but the country between Suleimaniyeh and Serdasht is very unsafe, on account of the depredations of the frontier tribes. A feast was taking place in the little town, with music and dancing. I found Serdasht to be situated some 4750 feet above the level of the sea. Suj-bulak I made 4450 feet, and not 4750 feet, as Mrs. Bishop states in her book. My


LAKE URUMIA
Marshes
46°E.
Road to Tabriz
Road to Maragha
37°
Miandab
Sanak Chai
Mt. Artar
Diabokri
Suj-bulak 4450
Ghrenna Chai
Mt. Kardai
Road
Afan
Tents
6520 Pass
Shak Chai
Baiz Agha
SKETCH MAP
of Mr W.B. Harris's Route
in
PERSIAN KURDISTAN
1896
Scale of Miles
0 10 20
1 inch = 12 miles or 1: 760000.
Author's Route
30°
Pass 6080
Kalka R.
Parast (deserted)
Forest
Maruf Agha
Benavila
Bolimarvas P.
Serdasht
4750
Shuashan
Gulta
Buerik
Birasu
Benavila 4200
Sindisa
Barmazeh
Gorge
Siama
Alimar
Khas Chai
Shadila
Zarvar-i-Sifla
Kaniau
Suaru Chai
Bana
Sholoku
Sakiz
Aichi
Tamaja
Mazuda
Dashlo
Bakajeh
Miradeh
Nobolu
Khalat
Wadi Agha
Kalakua P.
6940
Sabatu
Benivahin
Belava
36°

barometer was set at Batum, and corrected to Tabriz, taking the elevation of the latter at 4300 feet, which is agreed by the European inhabitants to be correct.

On May 23 I left Serdasht early in the morning, and, descending by a path in an execrable state on the south side of the Bolimarsas gorge, crossed the Kalu an hour later on a boat of timber and inflated skins, an exciting but none too safe passage of so turbulent a stream. Ascending on the east bank, we passed many picturesque villages, and entered an undulating plateau with exquisite scenery of park-like nature, here undulating green sward, and there dense forest of oak trees—the whole set to a background of rock and snow-peaks. Toward noon we breakfasted at the village of Benavila, on the plateau, at an elevation of 4200 feet—1000 feet above the bed of the Kalu river. Beyond this village the road continues level for about an hour and a half, when suddenly one comes across a deep gorge, through which flows a torrent, a tributary of the Kalu. A descent of over 1000 feet down the steep cliff was accomplished with no little difficulty, and then the other side had to be climbed. The whole gorge is dense forest, and very beautiful. The summit of the south side I found to be 4600 feet above the sea. This spot is known as Gamerjaz. The road still continued to ascend, and we pursued our former direction of south-east to Siama, a large village lying in what resembles the bed of a former lake, surrounded by hills and mountains. Here again the Kurds had never seen a European, but were most hospitable and polite, housing me in the village mosque, which they carpeted for the occasion, and lit a huge fire in the grate, for it was cold. In the neighbourhood are some curious mounds, about which the natives have traditions. I obtained some antiquities—coins, and seals, and cylinders.

On May 24 we crossed the Alimar Khan Chai, and continued through the districts of Mahmul and Shedila. The range here is known as Nuasger and Kanisu. Passing the large village of Zarnau-i-Sifla (4880 feet), and fording the Sueru Chai, we reached Bana about midday. Bana is a small town, with, like Serdasht, a Kurdish governor, and few or no inhabitants except Kurds. Again the hospitality shown me was very great, though I possessed no letters and no recommendations. Bana probably possesses from two to three thousand inhabitants.

I left Bana on May 25 at midday, and three hours later crossed the mountains to the north-west at an altitude of 6940 feet. Snow was lying at this spot, and at places the road was covered with it. Descending by the bed of a torrent on the opposite side, I spent the night at Miradeh, where, although the natives are Kurds, Persian style of architecture is found. We had left all the forest behind now, and reached an agricultural part of the country; nor were the Kurds so fine in appearance or character as in the valley of the Kalu. During the afternoon of May 26 I reached Sakiz, a small town on the Sinna-

Suj-Bulak caravan road. There is nothing of great interest to be seen, and the place is a very poor one.

From Sakiz to Sinna took us three days good travelling, for the most part on a high grassy plateau. The road takes a south-easterly direction for about half the distance, and then turns more directly south. The inhabitants, though still Kurds, have had most of their spirit crushed out of them by Persian oppression. The road possesses no difficulties, but is often the scene of violent robberies by the frontier tribes, who make these desolate plateaux their hunting-ground for spoil. The Khorkhora and Kizil-Uzen are the two large rivers crossed, but neither presents much difficulty in fording.

Of all the towns I saw on my travels, Sinna, the capital of Persian Kurdistan, is the most charming. Not only are its inhabitants most hospitable, but the climate and surroundings perfect; and during my stay I was treated as a sort of public guest, though again possessing no letters of introduction and recommendation. As in all the other towns mentioned, there are no European residents at Sinna. From Sinna a couple of nights of hard riding—on one of which we lost our way, and sat from 1 a.m. till dawn on the edge of a precipice—and Kermanshahan was reached. After a friendly rest there, I pursued my journey to Baghdad, where I arrived in the middle of June.

LIST OF KURDISH TRIBES IN PERSIAN KURDISTAN.

In the Vicinity of Sinna.

Telaku.	Manumi.	Shamasuri.	Jafakobadi.
Beliloan.	Perpéshai.	Sheikh Ismail.	Braz.
Galbari.	Lali.	Gurgei.	Sagaru.
Kumassi.	Zan.	Duraji.	Sagwan.
Orami.	Meraki.	Petiariwan.	Lakh.
Merivan.	Burakaïi.	Khoileshari.	

In the Vicinity of Sakiz.

Horhora and Eldi.

The Jof and many really Turkish tribes frequent the mountains near Sakiz in summer.

In the Vicinity of Suj-Bulak.

Mangur.	Malkeri.	Allani-Dulikan.	Kuluii.
Govrik.	Darmai.	Baski-Kolastah.	

In the Vicinity of Bana.

Tarjani.	Dashtatali.	Ikhtiari Dini.	Huein Beg.

Note.—The above is the only geographical manner in which it is possible to arrange these Persian-Kurdish tribes, as, owing to several often inhabiting the same regions, and their summer migrations to the mountains, they cannot be satisfactorily placed.

KILWA ISLAND, IN LAKE MWERU.*

By A. BLAIR-WATSON, Collector of Revenue, Mweru District.

KILWA island is triangular in shape, and lies in the south-west angle of Mweru lake, the apex of the triangle pointing towards the Luapula mouth. It lies much nearer to the west coast than to the east, the nearest point of the mainland being within 5 miles of the north-west corner of the island. It has an area of about 25 square miles. Except at two points, there is a belt of low-lying land along the shore, the interior being raised 200 to 300 feet, in three ranges of low hills; at these two points the hills run right down to the lake, ending in abrupt overhanging cliffs. The Red cliffs, mentioned in Mr. Sharpe's map, form one of these points, at the southern end of the island; at the north-west corner the cliffs are of limestone, and in these are the caves described beneath.

From the lake, at some distance off, the island appears very beautiful. The lower slopes of the hills and the low-lying lands beneath are thickly wooded, forming a fringe of forest round the coast. Above the tops of these trees appear the grass-covered hills, almost entirely destitute of trees, and, at a little distance, resembling downs in their smooth, undulating surface. When close, however, they are seen to be rough with rock and boulders, and the grass to be several feet in height. The scenery on the island is equally charming, though, except for the number of palms, palmyra, and the oil palm, not distinctively tropical. Of the hills, one range occupies the north-west corner; Simba's town stands close under them, in a bay facing north-west. The other two ranges occupy the north-east and south-east portions of the island, lying somewhat near the shore. Between these hills and the first range a broad flat runs right across from the north to the south shore. There are several small streams. The ground is exceedingly fertile, and seems to grow everything well. I have nowhere seen better Kafir corn, of which grain a large quantity is grown. There are also extensive rice-fields extending fully a mile along the shore. Palm trees are very numerous, the palmyra and the oil palm; hyphæne I did not notice. The palmyra grows chiefly along the lower slopes of the hills, and the oil palm is found in most abundance along the courses of the streams. Large quantities of palm oil are prepared by the natives, and a certain amount of trade used to be done in it on the east side of Mweru, where the tree is not found. I have no doubt they would grow here, and while at Kilwa I procured seeds, and have distributed some among the various chiefs in the district, in addition to planting some at Rhodesia.

The coast-line is surrounded generally by a dense marshy growth extending far out into the water, rendering landing from a boat very

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* Forwarded by H.M. Commissioner for British Central Africa, H. H. Johnston, C.B

difficult except at a few places where a break in this growth is found. Much of this vegetation, with which some of the small bays are choked up, doubtless comes from the Luapula river; floating islands of grass and papyrus, some of very considerable size, are brought down by the river in flood, and are constantly met with on the southern portion of the lake.

The "Red cliffs" form a promontory at the south end of the island, and extend for a total distance of about half a mile, with a height of 50 feet. The rock is a fine sandy shale very regularly bedded in layers from 2 to 4 inches in thickness, which separate easily, and would make admirable tiles for paving. The strata run horizontally.

The range of hills forming the cliffs at the north-west is mainly limestone. The greater part of this stone is impure, containing a considerable percentage of sand; indeed, some of the rock outcropping on the hill is rather a calcareous sandstone than a limestone proper. There is a considerable amount, however, of a purer limestone, which, burned, made very excellent lime. In the face of the cliff, half a mile west of the town, is the entrance to the series of caves and passages occupying the interior of the hill "Membo." These passages tunnel the hill to a great depth, and have a total length of many hundreds of yards. There is but one entrance, and this passage, not of large dimensions at the mouth, diminishes further as it runs in, reaching its narrowest point

about 40 yards in, where it is no more than 4 feet high and 3 feet broad. Beyond this point the passage widens, expanding at intervals into chambers. Branch passages also, similar in formation, are frequent, opening on both sides of the main passage. The latter terminates in a large vaulted cave lighted from a chimney-like opening through the roof, the exterior aperture of which is near the top of the hill. During the time Mshidi was raiding the west coast of Mweru and Kilwa island, several hundred natives were living in these caves.

Of game birds I saw guinea-fowl, partridge, and quail. Of antelopes there is but one, closely allied to the sitatunga (*Tragelaphus spekei*), but, I believe, a new species. The sitatunga, which is found along the southern shore of Mweru, and the lower marshy reaches of the Luapula, is well known to the natives under the name of "nje," and its horns may be seen in most of the lake and river-side villages. The natives agree in calling the Kilwa antelope a different species, and give it the name of "nzowi." The horns seem to be longer than the sitatunga's, with a different annulation, and from the pieces of old skins which were shown me, the adult animals, the males at least, seem to retain the usual tragelaph markings, which are said in the sitatunga to be lost on the animal attaining maturity. I have arranged that a representative pair of horns and male and female skins shall be kept for me at the time of the annual hunting, which takes place when the marshy vegetation fringing the island is dry enough to burn. I was told that when it is decided to set fire to this, powder is served out to all the men of the village, and an organized hunt takes place, both by canoe and on land, and that large numbers are killed annually on the few days this hunt goes on. It is only on the rarest occasions that one is seen or killed at any other time.

GEOGRAPHY AT THE BRITISH ASSOCIATION, IPSWICH, 1895.

The year 1895 will be memorable in geographical circles on account of the great International Congress, which attracted to London an assemblage of specialists in geography from all parts of the world, such as had never been brought together before. British Geographers accepted their position as hosts of their foreign colleagues in no grudging spirit, and in particular the Fellows of the Royal Geographical Society gave liberally of their money and time to make the meeting a success. The remark was more than once heard at the Congress that this year's meeting of Section E of the British Association at Ipswich would be a failure, as the meetings of July and August were providing enough matter for thought to satisfy the most enthusiastic geographers. The Ipswich meeting has not been a failure, however, and the stimulus of the Congress was traceable in more than one of the papers offered. It cannot be denied that the attendance of well-known men whose names usually swell the list of the sectional Vice-presidents and Committee

was smaller than usual, but the average quality of the papers was high, and the popularity of the Section undiminished.

The following is the official list of sectional officers :—

President:—H. J. Mackinder, M.A. *Vice-Presidents:*—Major L. Darwin; Col. H. H. Godwin-Austen, F.R.S.; Sir Joseph Hooker, F.R.S.; J. Scott Keltie; John Murray, D.SC.; E. G. Ravenstein. *Secretaries:*—John Coles; H. N. Dickson; H. R. Mill, D.SC. (*Recorder*); W. A. Taylor, M.A. *Committee:*—W. B. Blaikie; John Bolton; G. F. Scott Elliot, M.A.; Dr. H. O. Forbes; Dr. P. L. Sclater, F.R.S.; Eli Sowerbutts; G. J. Symons, F.R.S.; Coutts Trotter.

The Presidential address, which was printed in the October number of the *Journal*, was received with close attention, and warmly approved by the Section. The subject of geographical education is no new one at these meetings, but it is safe to say that never before has it been treated with such knowledge and practical directness.

The ordinary work of the Section proceeded in the usual way. In spite of the regular adjournment over the luncheon-hour, the attendance was very irregular, more than one of the best papers being read to audiences of less than fifty; but on a few occasions the hall was crowded by more than four hundred people. Only a few of the papers were adequately discussed. In some cases the absence of the authors, in others the length and irrelevance of some of the speakers, robbed the Section of a profitable discussion. The quality of the papers was above the average, although in number they fell below former years. A few were original communications; but, as usual, the greater number dealt with subjects already treated of at less general gatherings.

On Thursday, September 12, after the President's address at 11 a.m., Mr. H. S. Cowper gave a preliminary note on his recent journey through Tarhuna and Gharian, in Tripoli, of which a full account will be submitted to the Royal Geographical Society. Mr. Miller Christy read a short paper on Rockall, summarizing the scanty knowledge of that islet which we possess, and urging the importance of visiting the rock and studying its geology and fauna. He suggests that this would be an excellent expedition for an adventurous yachtsman. Rockall lies 185 miles west of St. Kilda, the nearest land, and it appears never to have been properly examined, the common statement that it is composed of "black granite' being an incidental proof of this. A brisk discussion on the value and practicability of Rockall as a meteorological station arose, in which Mr. G. J. Symons, Mr. Coles, Dr. H. R. Mill, and Mr. H. N. Dickson took part.

A paper by Dr. A. Markoff on "Western Siberia and the Siberian Railway," was communicated in the absence of the author.

On Friday, September 13, Mr. C. E. Borchgrevink gave a short account of his voyage to Victoria Land, and detailed his plans for an expedition to the Antarctic Regions, which he hopes to conduct from this country. He held, from his observations during the voyage

of the *Antarctic*, that there were commercial possibilities in the direction of guano, minerals, and probably whales, as well as seals in high southern latitudes. Sir Joseph Hooker spoke of his experiences in Sir James Clark Ross's expeditions, and stated that he had been struck by the close resemblance of the photographs brought home by Mr. Borchgrevink, to the sketches made in Ross's ship. Sir William Flower described the varieties of whales in the Arctic and Antarctic Regions, and spoke of the seal-hunting in Bering sea. He deprecated the attempt to combine scientific observation with commercial pursuits, and strongly urged that any future expedition for research should be purely scientific. Dr. John Murray also spoke in the discussion.

Mr. H. N. Dickson gave a paper on "Oceanographical Research in the North Atlantic," in which he showed, by a series of isothermal maps for the surface of the ocean, and the isobaric maps for the same period, that a close relation subsisted between the temperature of the water and the distribution of air-pressure on which the climate and weather of Western Europe depend. It was pointed out, in the discussion of this paper, that the union of oceanography and meteorology promised in this direction to be productive of results of practical importance. The lantern-slides illustrating the paper were much admired.

Dr. John Murray gave a short paper on "Oceanic Circulation," in which he reviewed the conclusions to which the discussion of the *Challenger* results had led him.

On Wednesday afternoon Mr. J. L. Myres read an ingenious paper on the "Maps of Herodotus," an abstract of which appeared in the Monthly Record. The subject is one which seems worthy of further study, and the method employed might possibly be extended to the interpretation of the works of other early writers.

Mr. W. B. Blaikie demonstrated the use of his cosmosphere, which he has much improved since he exhibited it at an afternoon meeting of the Royal Geographical Society.

Major Darwin read a short account of the Sixth International Geographical Congress, and referred to the resolutions adopted by it.

Monday, September 16, was largely devoted to Africa, but, on account of the hall being required for a meeting of the General Committee at 3.15, none of the papers were so fully discussed as they deserved to be.

Mr. G. F. Scott Elliot described his journey to Ruwenzori, and gave some account of the physical condition and resources of eastern tropical Africa. The main facts regarding this journey are already familiar to our readers. The paper was illustrated by fine lantern views.

Mr. E. G. Ravenstein submitted the "Report of the Committee on the Climate of Tropical Africa," the text of which was printed in the Monthly Record last month.

Captain S. L. Hinde described his experiences in the outlying parts

of the Congo State; and a paper by Mr. J. T. P. Heatly (an abstract of which appeared last month) on the "Port of the Upper Nile in relation to the Highways of Commerce" was read in abstract by Mr. W. A. Taylor.

Mr. A. Montefiore gave a preliminary account of the voyage of the *Windward* with the Jackson-Harmsworth expedition to Franz Josef Land, and of her return to Vardö after landing the exploring-party. Her arrival in that port coincided with the meeting of the Association, and as there were only somewhat meagre telegrams to go upon, full details of the journey could not be given at that time.

Mr. A. Trevor-Battye gave an interesting paper on the "Struggle for Existence under Arctic Conditions," in which he entered deeply into the fascinating subject of bio-geography, investigating the influence of geographical environment on the birds of the Arctic Region in particular.

The Rev. W. Weston described his explorations in the Japanese Alps between the years 1891–1894, during which he studied the mountains mainly as a climber, but also found time to make valuable observations on the flora, fauna, and especially on the people, who preserve many curious customs that have passed away in the less isolated parts of Japan.

Thursday, September 17, saw the work of Section E concluded with a set of papers dealing exclusively with Asia.

The "Report of the Committee for the Exploration of Southern Arabia" was read by the secretary, in the absence of Mr. Bent, who had drawn it up.

A paper on Formosa, by Mr. John Dodd, who was unable to be present, was read by Mr. Dickson. This paper gave an account of observations and explorations in the island of Formosa made by the author during his residence there from 1864 to 1890. After referring to the work of British naval officers, consular officers, commissioners of Chinese customs, and others, and giving a general geographical description of the island and its commerce, Mr. Dodd went on to discuss the probable origin of the aboriginal tribes occupying the highest mountain districts. The mode of life of the savage inhabitants was described—their dress, weapons, methods of hunting, marriage customs, etc.—and special reference was made to the practice of head-hunting, whether indulged in from motives of revenge or merely as a pastime. The paper next dealt with the Pepawhano, or descendants of the savages of the plains, their spoliation by Chinese immigrants, and the work of the Dutch missionaries amongst them. In the concluding section the author referred to the colonization of parts of Formosa by immigrants from Fokien, and to the Hakka invasion of the hill districts. Some account was given of the opening up to foreign trade, especially in camphor, coal, and tea, and an estimate was formed of the commercial resources of Formosa and of the prospects of their development. Mr. Dodd sent a special map of the island, and a number of water-colour sketches, which were exhibited in illustration of his paper.

Dr. A. Markoff read two papers, one on the "Russian Possessions in Central Asia" and the other on the "Towns of Northern Mongolia."

Mr. J. L. Myres finally gave an account of his recent researches in Caria, in Asia Minor.

After the usual vote of thanks to the local committee and the sectional officers, the Section adjourned until the meeting in Liverpool in 1896. On this occasion the preliminary work of the Recorder in arranging for the papers to be read was mainly done for him by Mr. H. N. Dickson, who volunteered his assistance, and carried out the arrangements most efficiently.

Two committees suggested by the Section were appointed by the Committee of Recommendations. One of these was the reappointed Committee on the Climate of Tropical Africa. The other, under the chairmanship of Mr. Mackinder, with Mr. Herbertson as secretary, and Mr. Keltie, Dr. Mill, and Mr. Sowerbutts as members, was appointed to investigate the teaching of geography in Great Britain.

The Section unanimously resolved to request the President to write a letter of condolence to the father of the late Mr. Joseph Thomson, expressing the high esteem in which his work is held, and the affection with which his memory is regarded by his fellow-geographers. They also authorized a letter of congratulation to Dr. John Murray on the completion of his labours on the *Challenger* reports. A similar compliment was paid to Dr. Murray by Section D, Biology; but, doubtless by accident, the address of the President of the Association omitted any notice of the magnificent results of the *Challenger* voyage, when touching on the landmarks of geography since 1831.

Papers of geographical interest were not confined to Section E. In Section A there were several communications on meteorological subjects, which, in the opinion of some, might profitably be transferred to the Geographical Section, where climatology is already naturalized. Many papers in Section C (Geology) involved a good deal of geography, especially those dealing with volcanoes, earthquakes, glaciers, coral reefs, and lakes. Section D (Zoology) opened with an address by Professor Herdman on "Oceanography," which was more geographical than some past presidents' addresses in Section E; and this was followed by several papers on distributional zoology, including the influence of geographical environment. In Section G (Mechanical Science) there were papers on the growth of the port of Harwich, on the action of wind and atmospheric pressure on the tides and on floods, as well as a most interesting description by Lieutenant B. Baden Powell of a new principle of aërial navigation, which he illustrated in the field by rising to a height of 50 feet in a car attached to a train of kites. The affinity of Section H (Anthropology) to Section E is very close; and the new Section K (Botany) has also its problems of a largely geographical nature. Several of the excursions proved of interest geographically, and perhaps none

more so than that to the Colne oyster fisheries under the leadership of the Mayor of Colchester.

Thus, it is well to remember that "Geography at the British Association" is a considerably wider title than "The Proceedings of Section E."

AFRICAN ETHNOLOGY.

By E. HEAWOOD, M.A.

In proportion as the purely geographical features of the African continent become well known, the attention of investigators is directed to more special branches of inquiry, such as (among others) those relating to the life of the inhabitants, their origin, migrations, etc., to which subjects an increasing number of publications are devoted.

The work lately brought out by M. de Préville* is concerned with the various types of society in Africa, and the causes which have occasioned their present condition and distribution. The general physical and climatic conditions of the habitat, being the most potent factors in the process of differentiation, the continent may be divided into four social, corresponding to the main physical, subdivisions, viz. those of the deserts of the north and south, the central plateau, and the mountainous region of the east. The first is the home of pastoral races, subject to the patriarchal rule generally associated with deserts. Even within its limits the type of society varies, according as the increasing humidity on either side of the tropic permits the camel to be replaced by horses, goats, or cattle, and according to the special industries (*e.g.* that of transport by caravans, the collection of gum, or the manufacture of goats'-hair fabrics) carried on in each zone. The cultivable oases are inhabited by a race marked by its activity and power of expansion. The fact that the four types here met with are observable also in South-East Asia favours the idea that they have descended, like great rivers, from a common home in that continent.

The grassy uplands of the eastern region have been peopled from the north-east by races whose special form of pastoral life, entailed by a necessity for annual change of pasture-grounds, leads to a three-fold division into elders, herdsmen, and soldiers. The custom of inheritance by the eldest-born prevails. The disorganized tribes, dislodged from the plateaux, support themselves in the lowlands by hunting and the cultivation of the plantain, and are easily subjugated by their more energetic neighbours.

In the southern region pasturage again forms the staple industry, variations of society, however, following those of climate and rainfall. A new element has here been introduced by the advent of Europeans. In the central region the chase has exercised the most important

* 'Les Sociétés Africaines.' Paris, Firmin-Didot.

influence, cattle-rearing being prevented (on any large scale) by the climate and the presence of the tsetse fly. Dependent on the chase is the trade in ivory, and, as its result, that in slaves also. M. de Préville subdivides this region according to the prevailing forms of cultivation by which the products of the chase are supplemented, the differing potentialities of different districts having probably influenced the direction of the various Bantu immigrations. The region of manioc—a product peculiarly adapted for the support of hunting tribes—occupies the whole southern Congo basin, and adjoining regions on the West Coast. That of the *eleusine* follows, with its head-quarters in the Niam-Niam countries, whose inhabitants possess a grain—poor, unpalatable, it is true, but providing a resource for the seasons of scarcity to which hunting tribes are always liable. Still further north is the region of durra, where the diminution of rainfall allows the cultivation of a more valuable cereal. A special place is occupied by the herdsmen and cultivators of the White Nile. In each of these subregions the author traces the particular way in which the mode of life reacts on society, showing, *e.g.*, how the Monbuttu, socially influenced by the harvest of the plantain and oil-palm, are formed into powerful clans, while their hunting neighbours, the Niam-Niam, exhibit only feebleness and division. That the former, with their rich plantain-groves, are cannibal no less than the latter, may perhaps be due to the contempt for outsiders naturally fostered by the clannishness just noticed. The vice is not found in the regions of manioc or durra.

The social facts observable may help us, M. de Préville thinks, to attack the problem of the origin of the races, especially difficult in the case of the negroes; and his conclusions, though largely based on hypothesis, are certainly ingenious and plausible. The most striking characteristic of the negro race is the absence of the patriarchal *régime*, which shows, in his opinion, that in its migrations from the primitive home of man it has always remained exempt from the social state imposed by deserts. Two routes from Asia to Africa satisfy this condition, one by Palestine and the Nile, the other by the Euphrates and the coasts of Arabia. They converge on the region of the Upper Nile, which on independent grounds has been seen to be the point of divergence of the various branches of the negro race, the two main types of which may be held to represent the immigrations by two routes. The author does not despair of the ultimate social regeneration of the negroes, when once the slave-trade is abolished. For this he looks not to the whites, who tend to profit by, and not to remedy, the inferiority of the negro, but rather to those of his own kin who have attained a higher social level in the United States and elsewhere.

The title of the second book we have to notice* is somewhat

* 'Die Heiden-Neger des ägyptischen Sudan,' by H. Frobenius. Berlin, Dietrich Reimer. 1893.

misleading, for it is only the fourth and last section which treats of the negro races of the Egyptian Soudan in detail, the first three being devoted—(1) to a sketch of the general geography of that region, its physical features, flora, forms of cultivation, etc.; (2) the general characteristics of the population, including the Arab tribes of Darfur, Kordofan, etc., whose contact with the negroes has been fraught with such baleful consequences to the latter; (3) a historical sketch of the course of events from the time of Mehemet Ali, through that of the earliest trading settlements and the occupation by Egypt, to the Mahdi revolt and its results. The book, therefore, to some extent lacks unity of plan. It does not lay much claim to originality—in fact, the author is careful to avoid speculative questions—but its value rather consists in the fact that it presents in a small compass (but in greater detail than is possible in a general work such as Ratzel's) information which can only be found otherwise scattered throughout the works of many travellers. It may suffice here to refer briefly to the section dealing with the negro tribes.

The general characteristics noticed by the author—the effects of the plurality of wives and large families of the chiefs, leading to intrigue and division in the state; the value which attaches to the possession of women, and the kidnapping expeditions and feuds which result; the childish nature of the negro and his delight in jest; the prevalence of superstition and absence of higher belief—are more or less common to the whole negro race. Of more special application are the notes on the industries and arts of the tribes, a survey of which, in conjunction with their physical and linguistic characters, is some help towards a provisional classification into natural groups. This the author attempts, while avoiding hasty conclusions as to their origin or affinities. The first group he entitles the swamp-negroes, embracing the Shuli, Shilluk, Dinka, Bari, etc., marked by a lank stature, dark colour, and very pronounced prognathism. Next come the Bongo, Mittu,* Krej, etc., inhabiting the northern slope of the watershed between the Congo and the Nile. In spite of considerable differences, they show a decided connection with one another as opposed to the former group, none of them keeping cattle, and all marked by a reddish hue, while iron-working is universally practised, favoured by the amount of that metal in the soil. South of the watershed come the groups of the Zande, or Niam-Niam, with tall muscular forms and fine features, and the Monbuttu practising the rite of circumcision, and in the form of skull recalling the Semitic type. The former are a mixture of heterogeneous tribes, over which the Zande proper have asserted their supremacy; the latter show much greater relationship between the component elements. The last two

* Keane (*Jour. Anth. Inst.*, 1885, p. 93) classed the Mittu with the black, long-headed type, while grouping the Bongo with the Zande, etc. (reddish, short-headed type).

groups are the Lattuka, east of the White Nile, who show marked differences from the neighbouring tribes, and have either migrated from the east, or are the remains of a former population; and the Bátua or dwarfs.

Among the reports of papers read before the Vienna Society for the Promotion of Scientific Knowledge, is that of one by Dr. Lenz, in March, 1894, in which the well-known African traveller gives a *résumé* of our knowledge of the so-called dwarf races of Africa, partly suggested by Dr. Stuhlmann's investigations, and the two individuals brought by him to Europe. In discussing the notices to be found in early writers, he draws a sharp distinction between the fabulous account of the pygmies in Homer, with passages of later writers evidently based on it, and the much more credible notices in Herodotus and the *Myriobiblon* of Photios, which agree in speaking, not of pygmies, but of tribes "under the middle stature." The doubt so often thrown on the existence of races of small men, was due to the unnecessary assumption for them of very minute stature, and their association with fabulous accounts of giants. During the last two centuries (but especially within the last few decades) trustworthy observations of tribes answering to the description of Herodotus have gradually accumulated, showing, in spite of variety of name, a remarkable ethnographical and anthropological unity. A consideration of the probable distribution of the other three main types of the African population, previous to the immigration of the Hamites, leaves, unpeopled by them, the vast forest region between 10° N. and 10° S. lat., which we may justly consider as having then been occupied exclusively by tribes, of which the Akka, Watua, etc., of the present day are the scattered remnants. It is to be hoped that the scanty anthropological knowledge we yet possess about these will be largely increased under the *régime* of secure means of communication in Africa.

The extremely interesting, but difficult subject of the migrations of African tribes is dealt with, so far as concerns the southern half of the continent, by Dr. K. Barthel, in the *Mitteilungen* of the Leipzig Geographical Society (1893). The uncertainty of the native traditions is such that, although these must necessarily be consulted for the purpose, it is, with few exceptions, only the accounts of travellers within the last century which form a reliable basis on which to build conclusions. The writer deals successively with the migrations of the Bushmen, Hottentots, and Bantu. Among the first he includes all the races of small stature met with in Central and South Africa, and his conclusions in this respect coincide with those of Dr. Lenz. The migrations of this tribe have been involuntary, consisting of flight before stronger races into the most inaccessible parts of the continent. Those of the Hottentots have of late years—their former history is involved in uncertainty—partaken of the same nature, being on the whole in a northerly direction,

and due to the pressure of the white colonists from the south. Those of the Bantu, of course, form the largest part of the subject, and are considered under three heads—(1) those south of the Zambesi; (2) those of Central and West Africa, between that river and the Equator; and (3) those in East Africa.

In the first region the Zulu migrations are the most important. This tribe, as well as the closely allied Caffres, seems originally to have come from the north-east, *i.e.* from equatorial East Africa, as is indicated by the fact that both tribes are cattle-rearers. Of historical migrations, that of the Matebele is most noteworthy, while others, of which only the tradition remains, account for the scattered tribes of Zulu origin in East Africa. Another important historical migration to the north in this region is that of the Makololo, who had their original home in Basuto Land. In the second region we have to depend chiefly on tradition, and the movements of tribes are not so clearly defined as elsewhere. A reason for the comparative stability of Central African states may be found in the fact that the people are all agriculturalists. A movement may often be traced from a central state outwards, as has been the case in Lunda. Here, too, restless trading tribes, like the Bangala and Kioko, have shifted their homes, while in the Central Congo basin, tribes like the Bakuba, Baregga, etc., appear to have come from the north-east. A movement from the centre towards the west coast, as, *e.g.*, that of the Fan, has not been uncommon. In the same direction was that of the Jagga, mentioned by the early writers on Angola, by which the old kingdom of Congo was shattered. In East Africa a shifting of population has been caused by the inroads of the Masitu (Zulus) from the south, and of the Masai, etc., from the north. The movements of the latter fall without the sphere of the article. That this eastern region was the starting-point of the Bantu migration is made probable by the fact that the characteristic occupations of the southern and central branches, cattle-rearing and agriculture, are here found united.

Copious references to authorities are given throughout Dr. Barthel's paper, and further study of the subject is thereby much facilitated.

THE MONTHLY RECORD.

THE SOCIETY.

The New Session.—The first meeting of the New Session will take place on Monday, November 11, when, after a brief introductory address by the President, Mr. A. Montefiore will give an account of the progress of the Jackson-Harmsworth Arctic expedition. The *Windward* has brought home full reports of the proceedings of the expedition up to date. These Mr. Harmsworth has kindly permitted Mr. Montefiore to make

use of in preparing the paper for the Society. As will be seen from the programme inserted in the present number of the *Journal*, the second meeting will be occupied by Dr. K. Grossmann, who will give an account of his recent visit to the Faeroe Islands, of the geology and physical geography of which he has made a special study. At the third meeting the Rev. W. Weston will describe his explorations in the Central Alps of Japan. As will be seen from the programme, several other papers are expected; it is hoped that before the end of Session Mr. and Mrs. Littledale will have returned from their adventurous journey across Central Asia. Among the other arrangements for the Session are several interesting subjects for discussion at the special afternoon meetings in the map-room.

EUROPE.

Physical Geography of the Tay Basin.—The Perthshire Society of Natural Science possesses in its newly opened museum at Perth one of the finest and best-arranged collections of local geology, fauna and flora, to be found in any part of the United Kingdom. The Society has just published, as an extract from vol. ii. of its *Transactions*, a series of papers on the "Natural History of the Banks of the Tay," which is in effect a study of the physical geography of the area drained by the river, not yet complete, but presenting an excellent instance of local scientific work. The papers now published include—(1) Physiography, by Dr. H. R. Mill and Mr. James Coates, treating of the topography, the agricultural divisions and rainfall of the basin, and the volume, velocity, salinity, and temperature of the river and estuary; (2) Geology, the stratigraphical and physical parts by Mr. Henry Coates, the superficial deposits by Rev. F. Smith; (3) Botany, by the late Dr. F. Buchanan White, who lays great stress on the part played by the river in the distribution of vegetation by carrying seeds, and also on the power of vegetation in altering the land by formation of marshes or islands in shallow water. Section 4 treats of Zoology—the Mollusca, by Mr. Henry Coates; Birds, by Colonel Drummond Hay; Mammalia, by Dr. Buchanan White. The concluding part treats of the Chemistry of the Tay Water, and is written by Dr. Andrew Thomson. Such an example as is here set might most advantageously be followed by other local scientific societies, which could take up the full study of a definite physical region of small extent, and so prepare the way for the compilation of a comprehensive geography of the British Isles such as has never yet been attempted.

Austrian Shipping on the Danube.—The Austrian shipping on the Danube is in the hands of the Imperial and Royal Danube Steamship Company. According to the latest returns, the length of the routes traversed in the year amounts to 2417 statute miles for passenger traffic and 3262 for the transport of goods. In 1893 the number of persons conveyed reached 3,151,414 and the goods carried amounted to 2,144,000 tons, 51·4 per cent. consisting of merchandise, 42·2 of corn, and 6·4 of coal. The traffic receipts amounted to £2,220,000 in 1893. The flotilla of the company consists (summer of 1895) of the following:—

Passenger steamers	58 paddle-steamers 3 screw-steamers	of 5138 nominal, 21,510 indicated horse-power.
Freight-steamers, canal-boats, etc.	94 paddle-steamers 20 screw-steamers 8 chain-ships	of 11,021 nominal, 41,480 indicated horse-power.
	787 barges with a capacity of 288,567 tons.	

ASIA.

Re-determination of Longitude between Greenwich and Madras.—The operations now in progress for determining the difference of longitude between Greenwich and India by telegraph by way of Teheran are of considerable importance, as all Indian map-work will in future be based thereon. The present longitude of Madras (to which those of all Indian stations are referred) is derived from Sir George Everest's lunar observations, which were taken about 1830. This determination is known to be over 2 miles wrong. All the Indian maps are projected with reference to this value, and to most of them a footnote is appended stating that the longitude is about 2′ 30″ in error. The difference of longitude between Bombay and Suez was determined by the Great Trigonometrical Survey of India in 1877, that between Suez and Greenwich having been previously determined by the British Transit of Venus expedition in 1874. This line, however, being unchecked, could not be relied upon with the confidence and certainty that ought to attach to the determination of fundamental longitudes; while, moreover, observations amply sufficing for transit of Venus purposes could not be said to be executed with the refinements and precautions requisite for purely geodetic purposes. It did not matter much, practically, what the longitude of the originating Indian station was so long as India was, so to speak, isolated, and her mapping remained unconnected with the European surveys. In fact, Madras might have been assumed to be a new zero, for the error was not large enough to affect navigation. But ever since our trans-frontier surveys have been extended into Afghanistan, Baluchistan, and Persia, inconvenience has been experienced by the officers charged with these operations, and a re-determination of the originating longitude became necessary. New telescopes and chronographs were obtained in October last year, and in November Captains S. G. Burrard and G. P. Lenox-Conyngham, R.E., started work. Karachi had already been joined with Madras, so, after obtaining sanction from the Secretary of State for India and the governments concerned, the arcs Karachi—Jask and Jask—Bushire were measured, the first by land line, and the latter by cable. Owing to the difficulties ever present in longitude operations, it was deemed advisable to check these by measuring the whole arc, Karachi—Bushire, Captain Burrard being the Jask observer, and Captain Lenox-Conyngham at Bushire. A circuit has thus been established between Karachi and Bushire, regarding which the observers feel perfect confidence. On each arc 300 stars were observed, 30 determinations of collimation and level, and 24 to 28 clock comparisons. With the aid of the astronomer royal, a convenient site for observation was founded on the true meridian of Greenwich, and the co-operation of Mr. Preece, engineer-in-chief to the General Post Office, having been secured, as well as that of the German government, the arc between Greenwich and Potsdam was satisfactorily measured in August last. As the Greenwich—Berlin and Berlin—Potsdam difference had been previously observed, a check-circuit has been obtained here. Captain Burrard is now at Potsdam, and Captain Lenox-Conyngham at Teheran, and they are at present engaged on the measurement of the arc between these two stations, which they anticipate completing in November. The former officer will then proceed to Bushire, when the Bushire-Teheran arc will be taken in hand, and the entire connection thus completed. By this plan of operations a verificating circuit has been secured at each end, and two single arcs in the centre, from which personal errors have been eliminated. The original design was drawn up in India, and included certain intermediate stations (Lowestoft, Emden, and Odessa), which, on the advice of Mr. Preece and Mr. Christie, were subsequently cut out, with the effect of simplifying the programme.

Mr. Rickmers in Trans-Caucasia.—Letters have been received from Mr. Willy Rickmer Rickmers, who, with Mr. H. Ingall and another companion, started in the beginning of last summer for an exploring trip in the Caucasus. Writing from Tiflis on September 25, Mr. Rickmers stated that he and his friends made their head-quarters in the Karch-Chal in July, and remained for two months and a half studying that mountain group. The numerous observations for altitude had not yet been worked up, but seven summits had been climbed, one at least of 12,000 feet. A plane-table survey was made, many photographs taken, and botanical and geological specimens collected. Mr. Ingall has recorded meteorological observations for two months without a break. The party intended doing further work in the Caucasus before the close of the year.

Danish Expedition to Central Asia.—A young Danish infantry officer, Lieut. Olufsen, intends in the beginning of next year to start to Samarkand, and here complete the preparations for an expedition to the Southern Pamir and Kafiristan. He will be accompanied by a young fellow-officer in the cavalry, Lieut. Philipsen; both are good sportsmen, and the leader has for several years studied topography and the Turkish language. A botanist may also accompany the expedition. The means at their disposal are moderate, and the object is stated to be exclusively scientific. The small expedition intends to start from Samarkand in May. It will follow the Serafshan river by the towns of Panja and Sabak, through the Pakshif Pass in the Serafshan mountains, crossing the Wadsh, a tributary of the Amu-Darya. Following the Panj, another tributary of the Amu-Darya, the expedition intends going to the town of Ishkasim, and thence *viâ* Sebak to Kafiristan, passing the Hindu Kush. The expedition hopes to be able to do some good topographical work, and obtain some useful results in ethnography, botany, zoology, etc., in those remote quarters of the world.

Salt Deposits in Persia and their Relation to the Sea.—The detailed examination by Dr. K. Natterer of the samples of water, salt, and soil brought by Dr. Stapf in 1885 from the steppe region east of Ispahan, has led him to some interesting comparisons between these inland salt deposits and the marine deposits from the Sea of Marmora and Eastern Mediterranean, examined by him at the same time. He has lately laid the results before the Imperial Academy of Sciences at Vienna. The most striking consists in the contrast brought out between the uniformity of chemical composition of the marine salts and the varied nature of that of the continental salt. This variety, according to Dr. Natterer, might, without apparent objection, be regarded as a result of such continued or periodic transport of small quantities of salt, which would be caused by a slow capillary mounting of the sea-water, and even that of inland lakes, in the soil of the deserts, as in a sponge. Although it is bold to assume such a movement of water extending over many miles, its very extent, he holds, would increase its importance for the promotion of gradual change of composition or position in the material of the continental masses. Salt derived by evaporation *in situ* from sea-water has a definite composition, lacking the variety of continental salt deposits such as those of Persia, while that brought from the surface of the sea by the agency of wind and rain is small in quantity, and differs little from ordinary sea-salt. Whereas if the deposits were due to the cause which Dr. Natterer suggests, the variety would be explained by the different rates of diffusion of the separate salts, and the different degrees in which they would be held back in masses of rock, sand, or clay. In the same way salts of the most varied composition might be formed in the neighbourhood of inland waters. By this hypothesis Dr. Natterer even suggests a solution of the problem of the peculiar composition of the salt dissolved in the water of the Dead

Sea. A capillary percolation of Mediterranean water within the under-water slope of the coast of Palestine and Syria (on which the sea-water is especially rich in organic substances) might supply the physical conditions requisite for the mutual working of chemical processes, whence the peculiarity of the Dead Sea salt would immediately result. Even the impregnation of the surrounding deserts with sodium chloride would find its explanation in the local conditions, if once Dr. Nattérer's hypothesis should become established. It is only right, however, to add that the hypothesis is of a very improbable character, and that the difference in the saline constituents of the sea and salt lakes is usually explained in a simpler manner, which has the advantage of being readily tested by observation.

The Tea Trade of Tibet.—Mr. A. de Rosthorn has published a short pamphlet on the tea cultivation in Western Szu-chuan and the tea-trade with Tibet *viâ* Tachienlu. From his experience Mr. de Rosthorn is inclined to state pretty positively that wild tea does not grow in Western Szu-chuan, while for the cultivation of the domestic tea-shrub, the people are dependent on the natives of the districts of Mingshan and Zangan, who have a monopoly of the art of raising tea from seed and laying out plantations. This tea is of relatively poor quality, its only export-market is in Tibet, and Yunnan tea is imported for the use of the well-to-do. The earliest record of the Tibet trade is in 1074 A.D., when the Tibetans bartered horses for tea in Shan-hsi. The trade was under government control from the first, the system of *permits* now in vogue was introduced in 1127. Tachienlu was made the tea market in 1696, and in 1719 market privileges were extended to Lit'ang and Pat'ang also. The tea administration is now a highly organized and somewhat complicated branch of government service. The permits are issued by the Board of Revenue in Pekin each season, and must be returned there by the end of the year, with the revenue arising from the amount of trade represented by them. Tachienlu is allotted 108,000 such permits; but the local officials are empowered to issue 10,800 additional permits after the regular ones are exhausted, and at a lower rate, the proceeds being their perquisite. Each permit covers five packages of tea, and no tea is admitted into Tachienlu without its permit, which is stamped on entering, and given up and the duty paid when the tea is sold. There is keen competition amongst merchants for the permits, which are distributed by the sub-prefect of Tachienlu through the district magistrates. Poor though the tea grown in Western Szu-chuan is, the first and second qualities are too good for Tibetan trade. The third quality alone is used, and only 35 per cent. of that is considered necessary to mix with 65 per cent. of twigs and branches of scrub-oak and other brushwood. The mixture is chopped fine, steamed in tubs, partially dried, mixed with enough rice-water to make it adhesive, and packed tightly in cylinders of bamboo matting, the whole weighing sixteen or eighteen catties. These packages can in no sense be termed bricks. The value of this mixture, after packing, is about two-thirds of a penny per pound, and the profits on its sale amount to 75 per cent. In transport by porters, eleven or twelve packages, weighing from 250 to 280 lbs., are carried as a load. When sold, the tea is sometimes re-packed, the cylinders being cut in half and sewn up separately in hide casings. Mr. de Rosthorn shows that the cheapness of this tea makes it nearly impossible for Indian tea to compete with it. The Chinese appear to be fully aware that if the monopoly of the tea-trade were to be done away with, Chinese political influence would lose hold in Tibet, and they are careful always to keep the permitted supply below the actual demand, and to concede to the Tibetans, as a privilege which may at any time be withheld, the right to purchase tea in the Tachienlu market.

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Danish Expedition to Central Asia.—A young Danish infantry officer, Lieut. Olufsen, intends in the beginning of next year to start to Samarkand, and here complete the preparations for an expedition to the Southern Pamir and Kafiristan. He will be accompanied by a young fellow-officer in the cavalry, Lieut. Philipsen; both are good sportsmen, and the leader has for several years studied topography and the Turkish language. A botanist may also accompany the expedition. The means at their disposal are moderate, and the object is stated to be exclusively scientific. The small expedition intends to start from Samarkand in May. It will follow the Serafshan river by the towns of Panja and Sabak, through the Pakshif Pass in the Serafshan mountains, crossing the Wadsh, a tributary of the Amu-Darya. Following the Panj, another tributary of the Amu-Darya, the expedition intends going to the town of Ishkasim, and thence *viâ* Sebak to Kafiristan, passing the Hindu Kush. The expedition hopes to be able to do some good topographical work, and obtain some useful results in ethnography, botany, zoology, etc., in those remote quarters of the world.

Salt Deposits in Persia and their Relation to the Sea.—The detailed examination by Dr. K. Natterer of the samples of water, salt, and soil brought by Dr. Stapf in 1885 from the steppe region east of Ispahan, has led him to some interesting comparisons between these inland salt deposits and the marine deposits from the Sea of Marmora and Eastern Mediterranean, examined by him at the same time. He has lately laid the results before the Imperial Academy of Sciences at Vienna. The most striking consists in the contrast brought out between the uniformity of chemical composition of the marine salts and the varied nature of that of the continental salt. This variety, according to Dr. Natterer, might, without apparent objection, be regarded as a result of such continued or periodic transport of small quantities of salt, which would be caused by a slow capillary mounting of the sea-water, and even that of inland lakes, in the soil of the deserts, as in a sponge. Although it is bold to assume such a movement of water extending over many miles, its very extent, he holds, would increase its importance for the promotion of gradual change of composition or position in the material of the continental masses. Salt derived by evaporation *in situ* from sea-water has a definite composition, lacking the variety of continental salt deposits such as those of Persia, while that brought from the surface of the sea by the agency of wind and rain is small in quantity, and differs little from ordinary sea-salt. Whereas if the deposits were due to the cause which Dr. Natterer suggests, the variety would be explained by the different rates of diffusion of the separate salts, and the different degrees in which they would be held back in masses of rock, sand, or clay. In the same way salts of the most varied composition might be formed in the neighbourhood of inland waters. By this hypothesis Dr. Natterer even suggests a solution of the problem of the peculiar composition of the salt dissolved in the water of the Dead

Sea. A capillary percolation of Mediterranean water within the under-water slope of the coast of Palestine and Syria (on which the sea-water is especially rich in organic substances) might supply the physical conditions requisite for the mutual working of chemical processes, whence the peculiarity of the Dead Sea salt would immediately result. Even the impregnation of the surrounding deserts with sodium chloride would find its explanation in the local conditions, if once Dr. Natterer's hypothesis should become established. It is only right, however, to add that the hypothesis is of a very improbable character, and that the difference in the saline constituents of the sea and salt lakes is usually explained in a simpler manner, which has the advantage of being readily tested by observation.

The Tea Trade of Tibet.—Mr. A. de Rosthorn has published a short pamphlet on the tea cultivation in Western Szu-chuan and the tea-trade with Tibet *viâ* Tachienlu. From his experience Mr. de Rosthorn is inclined to state pretty positively that wild tea does not grow in Western Szu-chuan, while for the cultivation of the domestic tea-shrub, the people are dependent on the natives of the districts of Mingshan and Zangan, who have a monopoly of the art of raising tea from seed and laying out plantations. This tea is of relatively poor quality, its only export-market is in Tibet, and Yunnan tea is imported for the use of the well-to-do. The earliest record of the Tibet trade is in 1074 A.D., when the Tibetans bartered horses for tea in Shan-hsi. The trade was under government control from the first, the system of *permits* now in vogue was introduced in 1127. Tachienlu was made the tea market in 1696, and in 1719 market privileges were extended to Lit'ang and Pat'ang also. The tea administration is now a highly organized and somewhat complicated branch of government service. The permits are issued by the Board of Revenue in Pekin each season, and must be returned there by the end of the year, with the revenue arising from the amount of trade represented by them. Tachienlu is allotted 108,000 such permits; but the local officials are empowered to issue 10,800 additional permits after the regular ones are exhausted, and at a lower rate, the proceeds being their perquisite. Each permit covers five packages of tea, and no tea is admitted into Tachienlu without its permit, which is stamped on entering, and given up and the duty paid when the tea is sold. There is keen competition amongst merchants for the permits, which are distributed by the sub-prefect of Tachienlu through the district magistrates. Poor though the tea grown in Western Szu-chuan is, the first and second qualities are too good for Tibetan trade. The third quality alone is used, and only 35 per cent. of that is considered necessary to mix with 65 per cent. of twigs and branches of scrub-oak and other brushwood. The mixture is chopped fine, steamed in tubs, partially dried, mixed with enough rice-water to make it adhesive, and packed tightly in cylinders of bamboo matting, the whole weighing sixteen or eighteen catties. These packages can in no sense be termed bricks. The value of this mixture, after packing, is about two-thirds of a penny per pound, and the profits on its sale amount to 75 per cent. In transport by porters, eleven or twelve packages, weighing from 250 to 280 lbs., are carried as a load. When sold, the tea is sometimes re-packed, the cylinders being cut in half and sewn up separately in hide casings. Mr. de Rosthorn shows that the cheapness of this tea makes it nearly impossible for Indian tea to compete with it. The Chinese appear to be fully aware that if the monopoly of the tea-trade were to be done away with, Chinese political influence would lose hold in Tibet, and they are careful always to keep the permitted supply below the actual demand, and to concede to the Tibetans, as a privilege which may at any time be withheld, the right to purchase tea in the Tachienlu market.

Tea Culture in Assam for 1894.—The number of tea-gardens on the register on December 31, 1894, was 823, against 794 on the same day in 1893, and the number of gardens which furnished statistics for the compilation of the report was 698, leaving 125 for which estimates had to be framed against 131 in 1893. A table is given showing the area under mature and immature plants and the total area held under tea-grants for each year since 1881, and from this it appears that the area under mature plants has increased each year in the period, from 133,293 acres in 1881 to 229,316 acres in 1894. The area under immature plants has increased from 25,134 to 39,480 acres, and the whole area under tea-grants from 706,649 to 1,059,237 acres between the same dates. The estimated yield of tea for 1894 was 94,829,059 lbs., or 414 lbs. per acre, against 94,219,904 lbs., or 426 lbs. per acre in 1893. The rainfall is given for eight stations. It varied in 1894 from 70·40 inches at Nowgong to 177·65 inches at Sylhet. The report is accompanied by an outline map on the scale of 1 : 3,041,280.

AFRICA.

The Korayo Valley, Somaliland.—Major H. S. Mainwaring, who made an expedition in Somaliland in 1894 in company with Mr. B. B. Christie and Lieutenant R. Sparrow, has sent us a map of the routes surveyed by him, together with some notes on the Korayo valley, the farthest point reached by the expedition. The routes led, to a considerable extent (as far as 42° E. long.), through the part of the country traversed by Dr. Donaldson Smith during the same year, but certain discrepancies are noticeable between the maps of the two travellers. The three streams supposed by Dr. Smith to unite with the Tug Turfa by a single channel north of 7° N. lat. (cf. *Journal*, 1894, p. 529; 1895, p. 135), are shown by Major Mainwaring as continuing southwards with independent courses southwards of that parallel. The Korayo valley, placed by Major Mainwaring north-west of the Tug Turfa or Turfo, would seem to be that of the Erer, visited lower down by Dr. Smith, and the physical features of the neighbourhood agree fairly well in the two accounts. The mountains, 3000 to 5000 feet high, marked on the American traveller's map, bear the name Mouldatta on Major Mainwaring's, and are said to be visible about 30 miles. The valley itself is described by the latter as quite the Eden of Somaliland, being thickly wooded, and the tops of the smaller hills covered with fresh green grass. At the bottom of the valley were found a running stream, luxuriant tropical vegetation, brilliant-plumaged birds, and bright flowers. It is unfortunately infested by a fly, apparently a species of tse-tsi, which proved fatal to the animals. Ten years ago the valley was thickly populated by a rich and warlike tribe (the Hawardens), but the great cattle epidemic raged here as in the rest of East Africa and the tribe broke up and dispersed, leaving the neighbourhood completely deserted, only about thirty individuals being found living in a cave. The natives declared that no white man had previously visited the valley.

Zanzibar, Zaila, and British Central Africa.—The annual Consular Reports for the year 1894, on these three British protectorates, have been lately issued. In all three a satisfactory increase of trade is to be observed. For Zanzibar the returns drawn up by Mr. Strickland, collector of customs, supply, as in former years, a detailed summary of imports and exports, in tables showing both the total amount of each article and the proportion of trade belonging to the various countries which have dealings with the port. A satisfactory point is that the increase both of imports and exports is an all-round one, distributed among the different countries represented. As regards imports, British India as usual heads the list, a large increase in that of grain being due to the failure of local crops; while of European countries Great Britain comes first, Hamburg next, and France

third. The increase from "Ibea" is but small, but that from the Benadir coast (under an Italian company) is striking. The rise in exports to foreign countries is due chiefly to cloves, of which the crop for 1893–94 was a very good one. Great Britain took the largest part of the produce generally, British India coming next, and France (whither most of the copra exported goes) third. The returns of the port officer show a slight increase in the total ocean-going tonnage, but a decrease in the coasting tonnage, perhaps owing to improved communications between Europe and the mainland ports. The trade of Zaila for the last nine months of 1894 show a very marked increase as compared with the two preceding complete years. This is due chiefly to heavy exports of coffee from Harrar, and to a large increase in the import of cotton goods. The causes of these fluctuations are uncertain, and it cannot be confidently predicted whether the improvement will be maintained or not. Mr. Sharpe's report on British Central Africa, which is merely supplementary to Mr. Johnston's late exhaustive report of his three years' administration, notes a marked increase, during 1894, both of the trade and revenue, the total volume of the former having risen from £72,781 to £85,000. The largest article of import is calico of various kinds, the bulk of which now comes from the United Kingdom instead of from India and America. The export of coffee has risen from 93,188 lbs. in 1893 to 165,320 lbs. in 1894. The number of steamers on the Zambesi and Lower Shire (excluding gunboats) rose from six to nine during the year, while one new steamer (the twin s.s. Livingstone) was built on the Upper Shire. A steel sailing vessel has been placed on Lake Tanganyika. Labour for the Shire highlands is well supplied by the influx of workers from the Nyasa districts, but the great want is a light railway to facilitate the transport of coffee from Blantyre to the Shire. The port of Chinde at the mouth of the Zambesi is rapidly growing in importance. The botanical aspects of British Central Africa have also been dealt with in a separate report by Mr. Whyte (Miscellaneous Series, No. 373), who describes the steps taken by him for the formation of a botanical and experimental garden at Zomba, where he has raised many varieties of foreign vegetables, fruit, and ornamental trees, etc., the introduction of which seems desirable. Experiments with economic plants continue also to be made by Messrs. Buchanan. Besides coffee and tobacco, Mr. Whyte considers that tea might become a profitable cultivation, and expresses great faith in the prospects of cacao, which valuable product he has taken steps to introduce from Grenada, in the West Indies. He also recommends the cultivation of rubber-bearing plants (both of indigenous species and those found in other continents), the gutta-percha tree (from Penang), fibre plants (especially the bow-string hemps), and nutmegs. The report concludes with a consideration of the threatened locust plague, and the possibilities of coping with it by the screen and trap system, as well as of other pests likely to influence the agricultural prosperity of the country.

POLAR REGIONS.

The Jackson-Harmsworth Expedition.—The *Windward* has arrived in the Thames, and brought with her very full records of the expedition in Franz Josef Land under Mr. Jackson. During the autumn and spring several journeys had been made and depôts established to beyond 81° N. lat. Mr. Jackson reports considerable alterations on the map of Franz Josef Land as compared with the maps in Payer's narrative. A good many photographs have also been sent home. The members of the expedition were in perfect health when the ship left. A full account of the work accomplished up to date by Mr. Jackson will be given at the opening meeting of the Society this session.

Lieut. Peary's Expedition.—On his arrival at St. John's, Newfoundland, Lieut. Peary cabled to the New York *Sun* full details as to his last journey across

Greenland, from which we extract the following. After the return of the *Falcon* last year, the explorer, with his servant, Henson, and Mr. H. Lee, made their way back to Anniversary Lodge, Bowdoin Bay, having obtained on the way 500 lbs. of venison, birds, and hare. In spite of a cold and stormy September, a further supply of deer and walrus meat for the winter was obtained, and the next proceeding was to attempt to dig out the *caches* which had been made on the ice-cap. Already, however, this was covered with an extraordinary depth of snow, while during the search a new storm came on, lasting for six days, and burying the stores of provisions beyond hope of recovery. Almost all the biscuit and milk, all the compressed pea-soup, pemmican, and alcohol were thus entirely lost, and their place could only be supplied by reindeer and walrus meat, coal-oil, and ship's biscuit in open boxes. The winter was occupied mainly in preparations for the journey, varied by occasional sledge trips and deer-hunts. At the end of February Mr. Lee was laid up for over two weeks, and was by no means in good condition when the final start was made on April 1. Six Eskimo accompanied the party during the first day, and four (reduced to three by desertion) were to continue further to the site of the pemmican cache, 124 miles from the ice-edge. A renewed search resulted in the discovery of one cache only, from which the supplies of tinned biscuit and milk were replenished, but of the pemmican cache not a trace could be seen. The Eskimo having departed home, the advance was made with three sledges and forty-one dogs, difficulties with the latter, and a violent wind-storm, much impeding progress, and Mr. Lee suffering much from frost-bite. At the end of the second week 200 miles had been travelled and an altitude of 7000 feet reached. The temperature ranged from $-10°$ to $-25°$ at noon and $-25°$ to $-30°$ at midnight. At times the elevation was almost 8000 feet, and though a moderate pace could be kept up without difficulty, any extra exertion was followed by bleeding from the nose, and the strength of men and dogs was reduced by one-half. Mishaps to the sledges soon occurred, and the walrus meat being spent, the dogs became so weak as scarcely to be able to walk. They were therefore left with Mr. Lee, while Lieut. Peary and Henson started off for the land to the north in search of musk-oxen. They returned once unsuccessful, but determined to try again, this time meeting with a herd, of which ten were shot. The three travellers then pushed on to Independence Bay, reaching the precipitous shore after four days' incredible toil, travelling over steep slopes, boulder strewn-gorges, and sharp rocks bare of snow, the almost complete absence of which was most annoying. A further search for musk-oxen proving unavailing, it became necessary to begin the return journey, six days being taken up in again reaching the moraine over the bare rocks. For neither men nor dogs did more than seventeen days' rations remain, whilst by the use of snow-shoes, icing the sledge-runners, and every other expedient for facilitating progress, the distance to Anniversary Lodge could only be reached in twenty-five marches. The last of the provisions were consumed at the beginning of the last march of 21 miles. All were in a debilitated condition, but gradually recovered. The *Kite* arrived in Whale Sound (the entrance to Inglefield Gulf) on July 31, and Messrs. Diebitsch and Salisbury reached the Lodge overland from McCormick Bay on August 3, ice preventing the advance of the ship. After various hunting excursions in Smith Sound, Wolstenholme Sound, etc., the ship proceeded southwards, and brought away two of the meteorites from Melville Bay, the larger weighing three tons. While steaming across for Godhavn the *Kite* was held in the pack for two days, but Disco was reached on September 11 and St. John's on the 21st. A most valuable Arctic collection has been brought back. Lieut. Peary maintains that the further observations he has been able to make practically prove the insularity of Greenland.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Oceanic Depths.—We are indebted to the Indiarubber, Guttapercha, and Telegraph Works Company, Limited, of Silvertown, for the printed records "E" and "F," of soundings taken by their ships while laying cables in different parts of the world. The cables, concerning which particulars are given, are (in Paper "E") those in the Pacific along the west coast of Central and South America, including the 1890–91 expedition, with 350 soundings, on 17 of which temperature observations were made; and the 1893 duplicate cable expedition, with 126 soundings, on 24 of which temperature, and on 21 specific gravity observations were made. The 1890–91 soundings were all obtained between Valparaiso and Lima; while the 1893 expedition lay between Lima and Tehuantepec. The other pamphlet records work in the Atlantic. They include the Third West African Expedition, 1889, with 48 soundings, most of them with temperatures, between 20° N. and 15° S. along the west coast between the Canaries and Mossamedes. Ninety-six soundings are given on the Western and Brazilian Cables Expedition of 1891, from Cape Frio to Cape San Roque along the Brazilian coast, 155 soundings, many of them with serial temperature observations, taken in 1891 across the Atlantic from near Pernambuco to Cape Verde. From the South American Cable Company's expedition of 1892 there are recorded 138 soundings, with many temperature and specific gravity observations, from Cape Verde to off Bahia, and then northward in different parallel lines, investigating banks in deep water near the meridian of 32° W. Seventy soundings are given, showing work done during cable repairs in 1893, between 14° 51′ and 15° 36′ N. and 18° 17′ and 17° 36′ W. off Cape Verde, in which the depth varied from 785 to 1515 fathoms. Finally, details of 31 soundings made in laying the Ceuta-Gomera cable are given. The 'List of Oceanic Depths and Serial Temperature Observations Received at the Admiralty During the Year 1894,' records a good deal of work by H.M. surveying ships in deep water—including soundings by H.M.S. *Penguin* and H.M.S. *Dart;* in the South Pacific, by H.M.S. *Egeria*, in the Bay of Bengal, Arabian Sea, and Mediterranean; by H.M.S. *Waterwitch*, in the vicinity of the Hayward and Dacia Banks off the north-west coast of Africa; and by the Indian Marine Survey ship *Investigator* in the Arabian Sea. The serial temperatures obtained by the surveying ships are given in detail. These records would be rendered much more useful if they were accompanied by a short statement as to how far they correspond with or modify the provisional submarine contours which now appear upon many maps.

The Deepest Ocean Sounding.—Admiral Wharton announces in *Nature* of October 3, that Commander Balfour of H.M.S. *Penguin* has obtained the deepest authentic sounding yet recorded. In the South Pacific Ocean, latitude 23° 40′ S., longitude 175° 10′ W., about 60 miles north of a sounding of 4428 fathoms obtained by Captain Aldrich in 1888, it was found that 4900 fathoms of wire ran out, but before the weight reached the bottom, the wire broke. The new depth, even taking it as 4900 fathoms (29,400 feet; 8960 metres, or 5½ miles), is 245 fathoms greater than the deepest sounding ever previously found, in the Tuscarora Deep. It is now clear that the greatest oceanic depression extends farther below sea-level than the highest mountain ascends above it.

Lakes and Climate.—Dr. Willi Ule, whose work on the lakes of northern Germany is well known, published a short paper on the influence of lakes on climate in a recent number of the *Naturwissenschaftliche Wochenschrift.* He states the effects produced by lakes on the climate of the neighbouring districts

as follows: The average annual temperature of lake-water being higher than that of the air, lakes exert on the whole a warming effect on the atmosphere. This is usually increased on account of the vertical distribution of water-temperature, but on the other hand diminished by the cooling effect of evaporation on the surface. Quite independent of the thermal reactions between water and air is the mirror-like action of the surface in reflecting the direct solar radiation into the surrounding air. The latter influence cannot be expressed statistically, and is probably only small. The supply of water-vapour yielded to the atmosphere is of value in moistening the neighbouring land, while the thermal changes over the water surface gives rise to currents of air which would not otherwise exist. There seems, however, to be a marked absence of proof as to the extent to which the various influences really work.

Recent Balloon Experiments in France.—In the *Comptes Rendus* of the Paris Academy of Sciences (vol. cxxi. p. 471) for September 30, MM. G. Hermite and Besançon describe, with the aid of a map and diagram, a remarkably interesting experiment in the management of ordinary balloons, of considerable importance in connection with Mr. Andree's proposed balloon expedition to the North Pole next year. At 11 p.m., on September 4, two balloons, the *Mage* and the *Archimedes*, were sent up. The *Mage*, keeping at the elevation of from 1000 to 3000 feet, was carried about 70 miles to the north-north-east of Paris, returning to the surface near Vauxresis, department Aisnes, at 5 a.m. The *Archimedes* at first kept within 350 feet of the ground, where a breeze was blowing exactly opposite to that prevailing in the higher layers of the atmosphere, and by 2.30 a.m. the balloon was over Chateaurenault in Indre-et-Loire, nearly 120 miles south-west of Paris. The aeronaut worked the balloon so far mainly by "guide-roping"; but, rising to over 1000 feet, too high for the use of the guide-rope, he got into the upper current and was carried back 60 miles to the north-east by 4.15, when sinking to about 500 feet, the lower current carried him again 70 miles to the south-west, until at 6.30 the rising sun expanding the gas in the balloon caused it to rise about 4000 feet, and it was carried back 60 miles to the north-east, descending at 8.25 a.m. close to Orgèces, which it had passed twice before on its zigzag journey. The *Mage*, keeping all the time in the upper current, had experienced some wonderful effects of moonlight on the mist which lay below, and before its final descent had remained in a dead calm for a quarter-of-an-hour at the height of about 300 feet.

GENERAL.

Geography in Mountaineering.—In Sir W. M. Conway's beautifully illustrated book, entitled 'The Alps from End to End,'* we find the record of an interesting journey along the whole line of the Alps from the Colle di Tendi in the west to the Sonnblick in the east. The object of this journey was partly to enforce on alpine-climbers the greater charm of a journey over a succession of peaks and passes, than a mere set of climbing exercises from a fixed centre; partly the object was to give two of the Gurkhas, who had already proved good mountaineers in the Karakoram expedition, an opportunity of seeing the methods of the best European guides. Both objects seem to have been fully attained. The book abounds in adventure and incident of the usual type, told with a cheery heartiness which strikes one pleasantly like a mountain breeze; but it has other qualities which entitle it to notice in these pages. The chapter on mountain-falls is a thrilling account of the great disaster at Elm, never, we believe, told in such detail in

* 'The Alps from End to End.' By Sir William Martin Conway. With 100 full-page illustrations by A. D. M'Cormick. Westminster: A. Constable & Co., 1895.

English before; it brings home the intensity which the common land-changing agencies of every country assume in mountainous regions. So, too, the description of the Glacier de la Plaine Morte is interesting from the geographical point of view. It is a rocky basin without visible outlet, and filled with a great expanse of snow and ice. The rocky rim runs continuously round the margin, and the drainage escapes by underground channels through the limestone bed. Sir W. M. Conway points out very justly that a true conception of a mountain range can be better obtained by a journey such as he describes than by climbing from a centre. He says (p. 10), "A traveller who approaches a group of mountains by way of the valleys, and climbs each peak from some valley centre, naturally receives the impression that the valley level is the normal one, and that whatever is above that level is part of a peak. The climber, however, who takes a line across a series of peaks and ridges cannot avoid more justly regarding the whole mountain-mass as an elevated region, from whose mean level he descends into excavated hollows, or mounts to the summits of protuberances which are in fact the relatively insignificant ruins of a formerly yet more elevated mass." Another valuable result of a long mountain journey is the power it gives the mountaineer of distinguishing the characteristics of natural regions. P. 12: "He learns to think of the Maritime Alps as a ridge lying between sea and plain and commanding views of both. The Cottians he remembers for their wave-like sequence washing south; the Graians for the seeming irregularity of their arrangement and the loveliness of their valleys and hillside tarns. Mont Blanc enthrones itself once for all in his mind as monarch of the whole range. The limestone wall-peaks that fringe the northern range from the Buet to the Glärnisch and yet further east, come to be thought of as a single feature characteristic of the region as a whole, comparable in this sense to the long depression of the Rhone and Rhine valleys. All the great groups, Pennines, Oberland, and so forth, come to be known, not by the individual peaks they bear—mere trifling Matterhorns, Finsteraarhorns, and the like—but as huge masses of the folded earth-crust, compared with which peaks are details of small account." It is a little surprising to find that the use of maps is not known to alpine guides. One says (p. 271), "I have come to the conclusion that all young men who want to be guides should learn the use of map and compass before they are licensed. There would be many fewer accidents in bad weather if that were done. We are too old to learn, of course, but the young men might learn if the Alpine clubs would arrange for having them taught." A curious comment on this appreciation of maps is the fact that the book itself is without one.

Congratulatory Address to Dr. Heinrich Kiepert.—On July 31, the fiftieth anniversary of the day on which Dr. Kiepert received his doctorate, an address of congratulation was presented to him by the Royal Prussian Academy of Sciences. The address, which is published in part xxxviii. of the *Sitzungsberichte* of the Prussian Academy of Sciences, after referring to the influences under which he was trained for his work, and to the principal achievements of his past career, winds up with the following words: "But within the sphere which you command, that land which is the most important for the history of ancient civilization is that which above all lies in your hands. Your study is the headquarters for the scientific conquest of Asia Minor. You know every point at which our knowledge halts, every gap in the course of a stream not yet completely explored. From you the traveller receives every accurate direction; you alone know how to appreciate, and in the proper place to make use of, every small step in advance. If, accordingly, we may add a wish to our heartfelt congratulations, and to our thanks for what you have been to the Academy, it is that it may be permitted to you to lay before the friends of geography and history your Asia Minor

with as much completeness and clearness as the state of our knowledge permits, and so also the whole *Orbis antiquus*, which we may regard as an academic work." A telegram of congratulation to Dr. Kiepert was sent on the same day from the President of the Sixth International Geographical Congress, in the name of all the geographers then assembled in London.

Italian Geographical Congress.—The second Italian Geographical Congress met at Rome during the latter part of September of the present year, being so arranged as to form part of the celebration of the twenty-fifth anniversary of the completion of Italian unity. The formal opening took place in presence of the King and Queen and other distinguished personages on September 22, the address being delivered by the Marquis Doria, President of the Italian Geographical Society. In the course of his speech he dwelt on the work of Italian explorers in North-east Africa, especially the lamented Prince Ruspoli, to whose father the gold medal of the Society was handed over as a memorial. For the business of the Congress four separate sections were formed, at the successive meetings of which numerous discussions were held and resolutions passed. In the first section, devoted to scientific geography, in addition to papers dealing with the physical geography of various parts of Italy, methods of survey, distribution of population, etc., resolutions were passed urging the importance of a systematic classification and nomenclature of lakes; of a determination of the areas of the separate subdivisions of the kingdom; of a more careful study of earth-movements in Italy; of a revision of the system of meteorological observations in the interests of barometric levelling; and of the study of the variations of Italian glaciers. The second section (economic and commercial) was occupied largely with the discussion of matters affecting the prospects of the Italian colony of Eritrea. The speakers on the whole took a favourable view of its resources, and recommended the encouragement of immigration by grants of land to agricultural labourers. The regulation by law of the pearl fisheries on the coast was also urged as a desideratum. The emigration question as affecting the relations of Italy with Brazil and other South American republics was discussed, and measures were recommended for the better protection of Italian emigrants. In the third (educational section) a discussion, initiated by Professor G. Marinelli, and continued by Professors Siragusa, Cora, and others, had for its subject a reform in the university system, with a view to improving the training of teachers for secondary schools. The introduction of a separate diploma in geography was recommended. A lengthened discussion also took place on the question of the subdivision of the mountains of the Italian Peninsula for didactic purposes; the propositions of Professor Porena being debated one by one, and a resolution finally carried, embodying the general sense of the meeting on the subject. In the last or historical section, the subjects dealt with included a proposed "Geographical Glossary of Italy in the Middle Ages;" suggestions as to the plan of a "History of Italian Cartography," and a proposal for a study of enclaves of foreign speech in Italy. Subjects of general interest were brought before general meetings of the Congress. The above account is taken from a report in *La Geografia per tutti* (September 30, 1895).

Scheme for the Investigation of Native Customs.—With a view to promoting the knowledge of the judicial, social, and other observances of aboriginal or partly civilized tribes, with especial reference to the Bantu race, the Berlin *Gesellschaft für vergleichende Rechts und Staatswissenschaft*, has, in the first number of its *Mitteilungen*, issued a scheme of inquiry, prepared by Dr. Max Beneke, for the guidance of those able to contribute information on the subject. This scheme, which is in the form of questions on the various points on which

information is desirable, is to be reprinted and issued gratis to all who may be willing to contribute to the objects in view, and the co-operation of governments, societies (scientific or missionary), and other bodies, has been asked in order to bring the matter before the individuals most competent to supply useful information. The inquiry is divided into various heads, dealing respectively with the observances in use with respect to public or private life, property, mutual obligations between members of the tribe, law of inheritance, judicial proceedings, and penalties for various transgressions, and is partly based on the material collected by Dr. Friedrichs of Kiel, and on a similar scheme of questions published in the *Bulletin de la Société des Etudes Coloniales*, by Drs. Cattier and Wodon.

A Slavonic Geographical Review.—We have received the first two numbers of *Sbornik*, the journal of the Chech Society of Geography at Prague, printed in the Chech language. As a society founded for the special study of a locality by the people residing in it, we welcome the new organization; but it is unfortunate that the geographers of Western Europe should be debarred from participation in the work that is recorded in the review. It is doubtful, indeed, whether the publication of original memoirs in local languages of small range, and offering no inducements for outsiders to acquire them, is in reality a way to advance science. For the locality, it no doubt is capable of doing valuable work, but it presents serious difficulties to foreign bibliographers in translating the titles, and to foreign printers in endeavouring to set up the original titles.

OBITUARY.

Bishop Chauncy Maples.

By the Rev. Horace Waller.

A brief telegram from Commissioner Johnston announces the death by drowning of Bishop Chauncy Maples, on Lake Nyasa, through the capsizing of a boat whilst the newly consecrated bishop was on the last stage of his return journey from England to the island of Likoma. The date given is September 12.

No man has been more identified with modern African missionary enterprise. Educated at Charterhouse and University College, Oxford, he joined Bishop Steere's staff at Zanzibar as a member of the Central African Mission in 1876. After a short stay on the mainland, he repaired to the Rovuma district; his principal work, however, will always be associated with Likoma, and the lake-dwellers' villages on the eastern shore of Nyasa.

Of a singularly happy and active disposition, a fluent linguist, and a man of many attainments, he, in company with his college friend, the Rev. W. P. Johnson, accomplished the heavy task of reducing the very difficult Yao language sufficiently to employ a company of native printers perpetually at work on translations in this and the Nyasa tongue for the use of the adjacent tribes. The *Nyasa News*, a periodical of Bishop Maples' creation, has served an especially useful purpose. It supplies us with good geography, ethnological and zoological treatises, together with Central African problems—as they occur to men on the spot—of the highest interest. By raising missionary literature out of the rut in which it is too apt to drag on at weary length, he did good service, and his loss must be keenly felt by those who know how entertaining African enterprise is, but how seldom the appreciative and sensible observer can be found to record it. For hard on twenty years Bishop Maples threw himself into the work of undermining the brutalities of tribes

steeped in slave-trading, and in the darkest spots of savagedom. At times his life was in the greatest danger, and never more so than when, in a Magwangwara raid, the Mission station near the Rovuma was sacked and burned. In spite of all obstacles, the lake-shore villages have numerous groups of converts; and churches, schools, and teachers are located over a considerable area. The sphere of these operations was assigned to Portugal when the division of territory took place, together with all the appliances for these civilizing processes. Bishop Maples seemed in his own person to prove what exceptions there are to the rule, for whilst to some a residence on Likoma island meant death in a few weeks, or the necessity for immediate removal, he himself had seldom to yield to the severe fevers of the lake.

That the Society has lost a clever contributor to its African knowledge will be only too plain when the articles and speeches are turned to which Bishop Maples contributed from time to time in our journals and at our meetings, and the members of the Royal Geographical Society will share in the profound regret which has been spread far and wide by the receipt of the above sad news. Bishop Maples was a life Fellow of the Society, having joined in 1884.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.	Mag. = Magazine.
Ann. = Annals, Annales, Annalen.	P. = Proceedings.
B. = Bulletin, Bollettino, Boletim.	R. = Royal.
Com. = Commerce, Commercial.	Rev. = Review, Revue, Revista.
C. R. = Comptes Rendus.	S. = Society, Société, Selskab.
Erdk. = Erdkunde.	Sitzb. = Sitzungsbericht.
G. = Geography, Geographie, Geografia.	T. = Transactions.
Ges. = Gesellschaft.	V. = Verein.
I. = Institute, Institution.	Verh. = Verhandlungen.
J. = Journal.	W. = Wissenschaft, and compounds.
M. = Mitteilungen.	Z. = Zeitschrift.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

EUROPE.

Alps. **Conway.**

The Alps from end to end. By Sir William Martin Conway. With 100 full-page illustrations by A. D. M'Cormick. Westminster: A. Constable & Co., 1895. Size 10 × 7, pp. xii. and 404. *Price* 21*s*. *Presented by the Publishers.*

The plan of the journey recorded in this splendid volume is noted in the Monthly Record.

Alps. *Le Globe* (*Mémoires*) **34** (1895): 1–21. **Ritter.**

Études sur l'orographie et l'hydrographie des Alpes de la Savoie. Par M. Étienne Ritter.

England—Cumberland and Westmorland. **Brockbank**

Mem. and P. Manchester Lit. and Philos. S. (4) **9** (1894–95): 195–205.

Notes on Glacier Moraines in Cumberland and Westmorland. By W. Brockbank. *With Plates.*

This appears to be the republication of a paper written twenty-five years ago, and

then only printed in abstract. It contains reproductions of excellent drawings of moraines in the Lake district, and suggestions as to the origin of the tarns by moraine-dams.

England—Glacial Deposits of the South-East. **Brown.**

Notes on the high-level river drift between Hanwell and Iver. By J. Allen Brown. Reprinted from the *Proceedings* of the Geologists' Association, vol. xiv., pp. 153-173 (August, 1895). Size 8½ × 6. *Sections. Presented by the Author.*

European Continent. **Lindley.**

The Great Eastern Railway Company's Tourist-Guide to the Continent. Edited by Percy Lindley. London, 1895. Size 7½ × 5, pp. 158. *Maps, Plans, and Illustrations. Price* 6*d*. *Presented by the Publishers.*

France—Alpes-Maritimes. *C.R.* **121** (1895): 137-141. **Bertrand.**

Sur la tectonique de la partie nord-ouest du département des Alpes-Maritimes. Note de M. Léon Bertrand.

France—Barrois. *Rev. G.* **37** (1895): 33-41, 85-99. **Despiques.**

Le Pays Barrois dans l'œuvre d'André Theuriet. Essai de géographie pittoresque. Par Paul Despiques.

This essay is interesting as an attempt to reflect from romance upon geographical instruction the vivid light thrown on romance by the study of the forms and products of the land. M. Theuriet seems to have himself possessed in no small measure the geographical instinct to which he drew attention in Balzac, and which appears so brilliantly in the writings of William Wordsworth and of Robert Louis Stevenson.

France—Haute Savoie. *Le Globe* (*Mémoires*) **34** (1895): 67-108. **Chaix.**

Contribution à l'Étude des Lapiés. La topographie du désert de Platé. Par Émile Chaix. *With Map and Plates.*

France—Migrations. **Turquan.**

Les courants de migration intérieure en France. Par M. V. Turquan.—Congrès National des Sociétés Françaises de Géographie. XV^e^ Session. Lyon, 1894. Compte rendu des travaux du Congrès. Lyon: E. Vitte, 1895. Size 10 × 6½, pp. 305-356.

France—Rhone Valley. *Ann. G.* **4** (1895): 432-452. **Depéret.**

Aperçu sur la structure générale et l'histoire de la formation de la vallée du Rhône. Par M. Ch. Depéret. *With Maps.*

Germany. **Hahn.**

Topographischer Führer durch das Nordwestliche Deutschland. Ein Wanderbuch für Freunde der Heimats- und der Landeskunde. Von Dr. F. G. Hahn. Leipzig: Veit & Co., 1895. Size 7 × 5, pp. xii. and 322. *Maps. Presented by the Author.*

This is a guide-book of a new type, designed for the use of students of nature. It gives prominence to the physical features of the district, with references to the influence of these features on the geography of the land. The plan is to consider detailed routes, and the book is adapted for the pedestrian, who should also carry good maps, for those included are mere sketches showing nothing but the routes. Professor Hahn promises to produce similar guide-books for other regions.

Germany—Frankfort-on-the-Main. **Bleicher.**

Statistische Beschreibung der Stadt Frankfurt am Main und ihrer Bevölkerung. Im Auftrage des Magistrats herausgegeben durch das Statistische Amt. II. Theil. Die innere Gliederung der Bevölkerung. Bearbeitet von dem Vorsteher des Statistischen Amtes. Dr. H. Bleicher. Frankfurt a. M., 1895. Size 11 × 7½, pp. 288 and lxxxvi. *Maps.*

Greece—Magnetic Conditions. *M.K.K. Militär G.I.* **14**, 1894 (1895): 187-241. **Hartl.**

Meteorologische und magnetische Beobachtungen in Griechenland, ausgeführt von Heinrich Hartl.

Iceland. *Scottish G.M.* **11** (1895): 441-466. **Johnston-Lavis.**

Notes on the Geography, Geology, Agriculture, and Economics of Iceland. By H. J. Johnston-Lavis. *With Illustrations.*

Ireland. **Ward.**

Thorough Guide Series. Ireland (Part II.) East, West, and South, including Dublin and Howth. By C. S. Ward. Twenty-six Maps and

Plans by Bartholomew. Third Edition—Revised. London: Dulau & Co., 1895. Size 6½ × 4½, pp. xvi. and 232. *Price* 5*s*. *Presented by the Publishers.*

This edition has been enlarged by the inclusion of a good deal of new matter, which makes the guide-book more serviceable than ever.

Russia—Kildin Island. *C.R.* **120** (1895): 1376–1377. **Venukoff.**

L'île de Kildine et ses particularités hydrologiques. Note de M. Venukoff.

Russia—Kolgueff Island. **Trevor-Battye.**

Ice-bound on Kolguev. A chapter in the Exploration of Arctic Europe, to which is added a record of the Natural History of the Island. By Aubyn Trevor-Battye. With numerous illustrations by J. T. Nettleship, Charles Whymper, and the Author, and three Maps. Westminster: A. Constable and Co., 1895. Size 10 × 7, pp. xxviii. and 458. *Price* 21*s*. *Presented by the Publishers.*

Mr. Trevor-Battye presents an excellent account of his recent visit to Kolgueff, with good illustrations and useful scientific appendices, giving much new information derived from his observations on the island and the collections which he brought home.

Russia—Rainfall. *Globus* **68** (1895): 213–218. **Köppen.**

Die Regengebiete des Europäischen Russlands nach der Verteilung der Tage mit Niederschlag über das Jahr. Von Dr. W. Köppen.

Scotland—Banks of the Tay. ———

The Natural History of the Banks of the Tay. Being a series of papers read before the Perthshire Society of Natural Science. [*Transactions*, Vol. II., Part II.] Perth: Published by the Society, 1895. Size 9 × 5½, pp. [64]. *Frontispiece. Price* 2*s*. 6*d*. *Presented by Henry Coates, Esq.*

This is noticed in the Monthly Record.

Scotland—Sutherland. *Scottish G.M.* **11** (1895): 385–393. **Cadell.**

The Scenery of Sutherland. By Henry M. Cadell. *With Maps and Illustrations.*

Spain. **Routier.**

Gaston Routier. Deux mois en Andalousie et à Madrid. Paris: H. Le Soudier, 1894. Size 10 × 6½, pp. 142. *Portraits. Presented by the Author.*

The record of a journalist who attended the Columbus fêtes in Spain. Portraits of the King and Queen-Regent of Spain, and of the King and Queen of Portugal, are reproduced.

United Kingdom—England. **Smith.**

Climbing in the British Isles. I.—England. By W. P. Haskett Smith. With twenty-three Illustrations by Ellis Carr, and five Plans. London: Longmans & Co., 1894. Size 6½ × 4½, pp. xii. and 162. *Price* 3*s*. 6*d*. *Presented by the Publishers.*

United Kingdom—Wales and Ireland. **Smith and Hart.**

Climbing in the British Isles. II.—Wales and Ireland. Wales. By W. P. Haskett Smith. Ireland. By H. C. Hart. With thirty-one Illustrations by Ellis Carr and others, and nine Plans. London: Longmans & Co., 1895. Size 6½ × 4½, pp. viii. and 198. *Price* 3*s*. 6*d*. *Presented by the Publishers.*

These little books are arranged in the form of an alphabetical Gazetteer, or rather Encyclopædia of Climbing. The entries refer to all important crags in the region treated of. They are written in the light vein characteristic of mountaineers, and the names of all the climbers who have been killed in their pursuit of this fascinating sport are mentioned in describing the scene of the accident. The illustrations are clear, and maps are not neglected.

ASIA.

Arabia. **Landberg.**

Arabica. Par le Comte de Landberg. No. III. Der Dialect von Hadramût. Les Métiers de Hadramût. D. H. Müller: Die Burgen und Schlösser Südarabiens. A. Seidel: Praktisches Handbuch der arabischen

Umgangssprache des ägyptischen Dialekts. Leyden: E. J. Brill, 1895. Size 9½ × 6, pp. 130. *Plates. Presented by the Author.*

The Count of Landberg announces his intention of continuing his periodical "Critica Arabica" under the title of "Arabica," and expresses his willingness to send the publication free on application to him at Schloss Tutzing, Upper Bavaria.

Arabia—Mecca. *B.S.G. Lyon* **13** (1895): 101–129. **Courtellemont.**

Un Voyage à la Mecque. Par M. Gervais Courtellemont.

M. Courtellemont, a young French artist in Algeria, having professed conversion to Mohammedanism, was allowed to make the pilgrimage to Mecca, and the incidents of the journey are here recounted by M. Gaston Laforest.

Armenia. *J. Tyneside G.S.* **3** (1895): 127–130. **Tcheraz.**

Armenia, the Country and the People. By Prof. Minas Tcheraz. *With Portrait.*

Asia. **Sievers.**

Asien. Eine allgemeine Landeskunde. Von Prof. Dr. Wilhelm Sievers. Leipzig and Vienna: Bibliographisches Institut, 1893. Size 10½ × 7½, pp. viii. and 644. *Maps and Illustrations (some coloured). Price* 15*s.*

Asia Minor—Anatolia. *Globus* **68** (1895): 57–64. **Kannenberg.**

Besuch in einem anatolischen Dorfe. Von Pr.-Lt. Kannenberg. *With Illustrations.*

Asia Minor, etc.—Murray's Handbook. **Wilson.**

Handbook for Travellers in Asia Minor, Transcaucasia, Persia, etc. Edited by Major-General Sir Charles Wilson, R.E., etc. *With Maps and Plans.* London: John Murray, 1895. Size 7 × 4½, pp. xii., [88], and 416. *Price* 18*s. Presented by the Publisher.*

This is practically a new book, and under the editorship of Sir Charles Wilson it includes the work of the first specialists on a variety of subjects, the history of Asia-Minor being treated by Prof. Ramsay and Mr. Hogarth, who also deal with many points of archæology; sport is dealt with by Col. Chermside and Major Bennet; the routes in the various parts of the extensive region considered are contributed by well-known authorities. There are several illustrations in the text, and the maps are numerous and of the latest date, that of Anatolia being specially compiled for the book.

Borneo—Mount Kinabalu. **Stapf.**

On the Flora of Mount Kinabalu in North Borneo. By O. Stapf, Ph. D. (Transactions of the Linnean Society, 2nd Ser. Botany, vol. iv., Part 2.) London, 1894. Size 12 × 9½, pp. [196]. *Plates. Presented by the Author.*

A notice of some of the more strictly geographical details of this magnificent piece of work will appear in the Monthly Record.

Central Asia. *G.Z.* **1** (1895): 257–285. **Obrutschew.**

Geographische Skizze von Centralasien und seiner südlichen Umrandung. Von W. Obrutschew. (Geographische Ergebnisse seiner Reise von 1892-94.) *With Map.*

China. **Rockhill.**

A Pilgrimage to the Great Buddhist Sanctuary of North China. By William Woodville Rockhill. Reprinted from *The Atlantic Monthly* for June, 1895. Size 9½ × 6½, pp. 14. *Presented by the Author.*

The account of a visit to Wu-t'ai shan in 1887, including some interesting descriptions of the Great Wall, Kalgan, and of the south of Mongolia.

China—W. Szuch'uan—Tea. **Rosthorn.**

On the Tea Cultivation in Western Szuch'uan and the Tea Trade with Tibet *viâ* Tâchienlu. By A. de Rosthorn. *With Sketch Map.* London: Luzac & Co., 1895. Size 7½ × 5½, pp. 40. *Presented by the Author.*

This pamphlet will receive notice in the *Monthly Record.*

Chinese Empire. *Nineteenth Century* (1895): 236–260. **Hallett and Black.**

New British Markets: (1) Western China. By Holt S. Hallett. (2) Tibet. By C. E. D. Black.

Chinese Empire—Tibet. **Raverty.**

Tibbat three hundred and sixty-five years ago. By Major H. G. Raverty. From the *Journal*, Asiatic Society of Bengal, vol. lxiv., Part 1, No. 2, 1895. Size 9½ × 6½, pp. 42. *Presented by the Author.*

An account of the country which we fear would scarcely be recognized in Europe

under its correct name of "Tibbat," as seen by "the Mughal Prince, the Mirza, Muhammad Haidar, the Gurgan, of the Doghl-at tribe of the Mughals," nearly 400 years ago. The system of spelling the various names is so complicated by the use of diacritical marks, joined letters, and combinations impossible in English pronunciation, that no ordinary reader could understand them. In a MS. note on the copy presented, Major Raverty protests against his editors having changed *ch* into *c*, *k* into *q*, and making other alterations in his spelling.

Chinese Studies. **Cordier.**

Les études Chinoises (1891–1894). Par Henri Cordier. "Extrait du T'oung-pao," Vol. V., No. 5, et Vol. VI., No. 1. Leide: E. J. Brill, 1895. Size 10½ × 7, pp. 90. *Presented by the Author.*

Chitrál. **Leitner.**

The Future of Chitrál and neighbouring countries. By G. W. Leitner. (Reprinted from the *Imperial and Asiatic Quarterly Review*, July, 1895.) Woking. Size 10 × 6½, pp. 20. *Maps and Portrait.*

Eastern Asia. **Cordier.**

L'Extrême-Orient dans l'Atlas Catalan de Charles V., Roi de France. Par M. Henri Cordier. (Extrait du Bulletin de géographie historique et descriptive, 1895.) Paris: Imp. Nationale, 1895. Size 11 × 9½, pp. 48. *Facsimiles.*

Formosa. **Garnot.**

L'Expédition Française de Formose 1884-1885. Par le Capitaine Garnot. With Atlas. Paris: Ch. Delagrave, 1894. Size 9 × 6; (Atlas), 12½ × 11, pp. 10 and 234. *Illustrations. Price* 10 *francs.*

A valuable contribution to our knowledge of this still largely unexplored island.

Formosa—Bibliography. **Cordier.**

Bibliographie des ouvrages relatifs à l'Ile Formose. Par Henri Cordier. Chartres: Imp. Durand, 1893. Size 12 × 9½, pp. 60. *Presented by the Author.*

This exhaustive bibliography forms part of the great work of Imbault-Huart entitled "L'Ile Formose," and gives a transcript and occasionally a facsimile of the titles of all known works dealing with the island to the close of 1892.

French Indo-China—Red River. **Escande.**

Rev. Maritime et Coloniale **126** (1895): 63–81.

Étude sur la navigabilité du fleuve Rouge. Par M. Léon Escande.

Lieut. Léon Escande, on the French gunboat *Moulun*, made two trips on the Red River, to test its navigability and survey the surrounding country, in March, April, and May, 1893, and from November, 1893, to June, 1894. The result was to prove that vessels drawing 3 feet 3 inches and steaming 8 to 10 knots can navigate the Red River as high as Lao-Kai all the year round; while during half the year vessels of twice the draught could ascend to the frontier of Tonkin if capable of steaming 10 to 12 knots. The arrival of French gunboats on the upper river has enabled the native junks to trade freely by suppressing the piratical tribes living on the banks.

India—Malabar. **Hirth.**

Das Reich Malabar nach Chao Ju-Kua. Von Friedrich Hirth. Separatabdruck aus T'oung-Pao, Vol. VI., No. 2. Leyden: E. J. Brill, 1895. Size 10 × 6½, pp. 16. *Presented by the Author.*

Japan. **Wilson-Carmichael**

From Sunrise Land. Letters from Japan. By Amy Wilson-Carmichael. Preface by Rev. C. A. Fox. London: Marshall Bros., 1895. Size 8½ × 7½, pp. xii. and 180. *Illustrations. Price 5s. Presented by the Publishers.*

Missionary letters, of interest on account of the graceful Japanese drawings which are interspersed.

Japanese Alps. *Alpine J.* **17** (1895): 493–510. **Weston.**

Mountaineering and Mountain Superstitions in the Japanese Alps. By the Rev. Walter Weston. *With Illustrations.*

Malay Archipelago. *Tijd. K. Ned. Aardrijks. Genoots* (2) **12** (1895): 363–394. **Kan.**

Het maritiem onderzoek van den Oost-Indischen Archipel. Door Prof. Dr. C. M. Kan.

Malay Archipelago—Java. **Oudemans.**

Die Triangulation von Java ausgeführt vom Personal des geographischen Dienstes in Niederländisch Ost-Indien. Vierte Abtheilung. Das primäre Dreiecknetz. Im Auftrag des Ministeriums der Kolonien und unter Mitwirkung von J. C. A. Van Asperen, M. L. J. Van Asperen, W. G. Teunissen, bearbeitet von Dr. J. A. C. Oudemans. Hague: M. Nijhoff, 1895. Size 14 × 11, pp. iv. and 224. *Plates. Presented by the Editor.*

Malay Archipelago—Sumatra. **Meerwaldt.**

Tijds. Ind. Taal-Land-en Volkenk. **37** (1894): 513–550.

Aanteekeningen betreffende de Bataklanden, door J. H. Meerwaldt.

A general account of the Batak land and people, compiled from the chief authorities.

AFRICA.

Africa. **Sievers.**

Afrika. Eine allgemeine Landeskunde. Von Prof. Dr. Wilhelm Sievers. Leipzig und Wien: Bibliographisches Institut, 1891. Size 10½ × 7½, pp. viii. and 468. *Maps and Illustrations (some coloured). Price* 12*s.*

Africa and Europeans. *Nineteenth Century* (1895): 455-465. **White.**

Africanists in Council. By A. Silva White.

A criticism of the discussion on Europeans in Africa, held at the Sixth International Geographical Congress.

British East Africa—Uganda, &c. **Colvile.**

The Land of the Nile Springs; being chiefly an account of how we fought Kabarega. By Colonel Sir Henry Colville, K.C.M.G., etc. Illustrated by Mr. J. Burrell-Smith and Mr. Twidle, from sketches by the author and Major Thurston, and from photographs by the author. London: Edward Arnold, 1895. Size 9 × 6, pp. xiv. and 312. *Maps. Price* 16*s. Presented by the Publisher.*

After a thoroughly characteristic preface by way of good-humoured but quite unnecessary apology, Sir Henry Colville describes his journey from Mombasa to Uganda, gives an account in three very short chapters of Usoga, Uganda, and Kampala, and then enters at some length into the history of his adventurous campaign against Kabarega. The author protests against the usual spelling of some Swahili names, saying that Mkuyuni and Ndi, for example, are pronounced Emkuyuni and Endi, and should be so written. In the course of the operations the expedition made the circuit of Lake Albert, and also visited a number of points on the plateau between Lake Albert and the Victoria Nile.

British East Africa—Uganda. *Contemporary Rev.* (1895): 15–20. **Elliot.**

The best route to Uganda. By G. F. Scott Elliot.

Mr. Scott Elliot advocates the route from the Zambesi by way of the lakes, constructing railways between the stretches of waterway.

Congo Free State. **Delporte and Gillis.**

Mém. Couronnés and Mém. Savants Étrangers A. R. Belgique, **53** (1894): 1–114.

Observations Astronomiques and Magnétiques exécutées sur le territoire de l'État Indépendant du Congo. Par le Capitaine Adjoint d'État-Major A. Delporte et le Capitaine Adjoint d'État-Major L. Gillis. *With Plates.*

This will be specially noted.

East Africa—Jub River. **Bóttego.**

Vittorio Bóttego. Viaggi di scoperta nel cuore dell' Africa. Il Giuba Esplorato sotto gli auspici della Società Geografica Italiana. Rome: E. Loescher and Co., 1895. Size 10 × 7, pp. xiv. and 538. *Portrait, Maps, and Illustrations. Price* 8*s.*

A handsome and richly illustrated volume giving a full account of the journey of Bóttego and Grixoni for the exploration of the Jub river.

East Africa—Sesse Islands. *Petermanns M.* **41** (1895): 169. **Brard.**

Die Sesse-Inseln. Nach brieflichen Mitteilungen. Von P. Brard. *With Map.*

Egypt—Red Sea. **Buxton.**

On either side of the Red Sea. With illustrations of the Granite Ranges of the Eastern Desert of Egypt, and of Sinai. By H. M. B., C. E. B., and

T. B. With an Introduction and Footnotes by E. N. Buxton. London: E. Stanford, 1895. Size 8½ × 6½, pp. viii. and 164. *Illustrations. Presented by E. N. Buxton, Esq.*

The series of letters published here give an excellent idea of two interesting holiday trips—one up the Nile to Keneh and thence into the desert, the other in the Sinaitic peninsula. The illustrations are uniformly good, and many of them of unusual interest, showing typical views of desert scenery.

Eritrea. **Franchetti.**

Secondo Congresso Geografico Italiano. L'avvenire della colonia Eritrea. Conferenza tenuta dall' onorevole Barone Leopoldo Franchetti nell' Adunanza generale del 24 settembre, 1895. Roma: Presso la Società Geografica Italiana, 1895. Size, 10 × 6½, pp. 24. *Presented by the Author.*

Eritrea. *Globus* **68** (1895): 85–87. **Fritzsche.**

Die Bevölkerungsverhältnisse der italienischen Kolonie Erythræa. Von W. H. Fritzsche. Rom. *With Map.*

French Congo. *B.S.G. Paris* (7) **16** (1895): 211–218. **Berton.**

De Lastourville sur l'Ogôoué à Samba sur le N'Gounié (septembre et octobre, 1890). Par J. Berton. *With Map.*

German East Africa. **Peters.**

Das Deutsch-Ostafrikanische Schutzgebiet. Im amtlichen Auftrage von Dr. Karl Peters. Munich and Leipzig: R. Oldenbourg, 1895. Size 10 × 7, pp. x. and 468. *Maps and Illustrations.*

German East Africa. **Ramsay and Stuhlmann.**

M. Deutsch. Schutzgeb. **8** (1895): 141–145.

Astronomische Ortsbestimmungen des Herrn Kompagnieführers Ramsay auf der Reise von Kisaki nach Dar-es-Salâm im April und Mai des Jahres 1894. Berechnet von Dr. L. Ambronn.

Neue astronomische Bestimmungen des Herrn Dr. Stuhlmann in Ostafrika aus dem Jahre 1894. Berechnet von Dr. W. Brix.

Madagascar. *Rev. Scientifique* (4) **4** (1895): 107–112. ———

Le sol et le climat de Madagascar au point de vue de l'agriculture.

Madagascar. *Rev. Scientifique* (4) **4** (1895): 231–236. **Meunier.**

Le sol de Madagascar. Par M. Stanislas Meunier.

Madagascar—Place-Names. *B.S.G. Commerc. Paris*, **17** (1895): 589–598. **Grandidier.**

Des principaux noms de lieux de Madagascar et de leur signification. Par M. Alfred Grandidier.

Madagascar. **Piolet.**

Madagascar et les Hova. Description, Organization, Histoire. Par J. B. Piolet. Paris: C. Delagrave, 1895. Size 9 × 6, pp. 284. *Map. Price 5 fr.*

M. Piolet, a former missionary amongst the Hova, gives a careful account of the characteristics and history of that people, and then proceeds to state the case for French interference and to demonstrate the necessity for the absolute possession of the island by France.

Madagascar. **Routier.**

Gaston Routier. Les Droits de la France sur Madagascar. Paris: H. Le Soudier, 1895. Size 7½ × 5, pp. 272. *Presented by the Author.*

The title of this work sufficiently indicates its purpose and its contents.

NORTH AMERICA.

British North America—Labrador. *Scottish G. Mag.* **11** (1895): 335–361. **Bell.**

The Labrador Peninsula. By Robert Bell. *With Map and Illustrations.*

Canada—Alberta. *J. Geology* **3** (1895): 507–511. **Dawson.**

Notes on the Glacial Deposits of South-western Alberta. By George M. Dawson.

Mexico. **Routier.**

Gaston Routier. Le Mexique. Limites géographiques, Orographie, Hydrographie, l'Agriculture, la Flore, la Faune et les Mines, l'Industrie

et le Commerce. Avec une Préface de Ignacio Altamirano. Paris: H. Le Soudier, 1891. Size 10 × 6½, pp. xviii. and 110. *Map. Presented by the Author.*

Mexico. **Routier.**

Gaston Routier. L'histoire du Mexique. Le Mexique de nos jours. Renseignements économiques and messages présidentiels. Paris: H. Le Soudier, 1895. Size 7½ × 5½, pp. l. and 196. *Portrait.*

A sketch of the history, constitution, and resources of Mexico.

United States. ——

Annual Report of the Chief of Engineers, United States Army, to the Secretary of War, for the year 1894. 6 Parts. Washington: 1894. Size 9½ × 6, pp. 3592. *Maps, Plans, &c. Presented by the Engineer Department, U.S. Army.*

United States—Alaska—Baird Glacier. *J. Geology* **3** (1895): 512–518. **Klotz.**

Experimental application of the Photo-Topographical method of surveying to the Baird Glacier, Alaska. By Otto J. Klotz.

United States—Alaska—Magnetic Declination. **Schott.**

Treasury Department, United States Coast and Geodetic Survey, W. W. Duffield, Superintendent. Bulletin No. 34. Distribution of the Magnetic Declination in Alaska and adjacent waters for the year 1895. With one chart. A report by C. A. Schott. Washington: Government Printing Office, 1895. Size 9 × 6, pp. [8].

United States—Alaska—Yukon River. *B. American G.S.* **27** (1895): 143–160. **Russell.**

A Journey up the Yukon River. By Israel C. Russell. *With Illustrations.*

United States—Chinuk Texts. **Boas.**

Smithsonian Institution, Bureau of Ethnology, J. W. Powell, Director. Chinook Texts. By Franz Boas. Washington: Government Printing Office, 1894. Size 10 × 6½, pp. 278. *Portraits. Presented by the Smithsonian Institution.*

United States—Maryland. **Silver.**

Johns Hopkins University Studies. Thirteenth Series. X. The Provisional Government of Maryland (1774–1777). By John Archer Silver. Baltimore: the Johns Hopkins Press, 1895. Size 9½ × 6½, pp. 62.

United States—Maryland, etc., James and Potomac Valleys. **Fowke.**

Smithsonian Institution, Bureau of Ethnology, J. W. Powell, Director. Archæologic Investigations in James and Potomac Valleys. By Gerard Fowke. Washington: Government Printing Office, 1894. Size 10 × 6½, pp. 80. *Illustrations. Presented by the Smithsonian Institution.*

United States—New Jersey. **Gannett.**

A Geographic Dictionary of New Jersey. By Henry Gannett. Bulletin of the United States Geological Survey, No. 118. Washington: Government Printing Office, 1894. Size 9 × 6, pp. 132. *Presented by the U.S. Geological Survey.*

An index, with a few descriptive words under each name, of the Geological Survey's 1-inch topographical map of New Jersey in forty-nine sheets.

United States—Niagara. *Blackwood's Mag.* (1895): 430–444. **Forbes.**

Harnessing Niagara. By George Forbes.

An account of the utilization of the water of the Niagara river for the electrical transmission of power.

SOUTH AMERICA.

Andes. *Deutsche Rundschau G.* **17** (1895): 560–562. **Gregor.**

Der Weg über die Cordillere zwischen Argentinien und Chile. Von J. Greger. *With Illustrations and Map.*

Argentine and Chilian frontier. *B.I.G. Argentine* **16** (1895): 3–16. ——

Nuestros limites con Chile.

Argentine and Chilian Frontier. *Globus* **68** (1895): 112–114. **Polakowsky.**

Die Grenze Argentiniens gegen Chile. Von Dr. H. Polakowsky.

Argentine Republic and Paraguay. **Doering.**

B.A. Nacional Ciencias Córdoba **14** (1894): 117–292.

Observaciones magnéticas ejecutádas de 1884 á 1888, en la República Argentina y el Paraguay, con un magnetómetro de desviación. Por Oscar Doering.

Argentine Republic—Caingué Indians. **Ambrosetti.**

B.I.G. Argentino **15** (1895): 661–744.

Los Indios Caingué del Alto Paraná. Por Juan B. Ambrosetti. *With Illustrations.*

Guiana—French Explorations. **Froidevaux.**

Explorations Françaises à l'intérieur de la Guyane pendant le second quart du XVIII^e^ siècle (1720–1742). Par M. Henri Froidevaux. (Extrait du Bulletin de géographie historique et descriptive, 1894.) Paris: Imprimerie Nationale, 1895. Size 10 × 6½, pp. 90. *Maps. Presented by the Author.*

Venezuela. **Goering.**

Vom tropischen Tieflande zum ewigen Schnee. Eine malerische Schilderung des schönsten Tropenlandes Venezuela. In Wort und Bild von Anton Goering. Leipzig: Adalbert Fischer's Verlag [n. d.]. Size 17 × 13, pp. 78. *Map, Coloured Plates, etc.*

An enthusiastic description of the natural characteristics of Western Venezuela as studied by the author during a long sojourn in the country. The illustrations are from paintings and sketches by the author, and the beautiful reproduction of the large pictures gives a vivid idea of the wealth of colour in plant, soil, and sky as one ascends from the tropical plains of Marecaibo to the eternal snow of the Cordillera.

AUSTRALASIA AND PACIFIC ISLANDS.

Australia. **Calvert.**

The Exploration of Australia. By Albert J. Calvert. London: G. Philip & Son, 1895. Size 11½ × 9½, pp. 236. *Map, Portrait, etc. Presented by the Author.*

This, we believe, is larger than any other of the voluminous works bearing Mr. Calvert's name, and the manner in which it is prepared by the publisher is almost perfect.

Australia—Physical Geography. **Barton.**

Outlines of Australian Physiography. By Charles H. Barton. Maryborough: Alston & Co., 1895. Size 7½ × 5½, pp. 180. *Presented by the Publishers.*

One of the soundest and best-written descriptions of the physical features and conditions of Australia. Perhaps a little advanced for a University extension audience—to which they were delivered as lectures—the chapters succeed in giving prominence in due proportion to many facts in physical geography as exemplified in Australia. It would have been better to avoid the too general title of Physiography.

GENERAL.

Educational. **Robertson.**

The Geographical Congress and Geographical Education. By C. Robertson, M.D. Edinburgh: St. Giles' Printing Co., 1895. Size 7 × 5, pp. 12. *Presented by the Author.*

Dr. Robertson supposes that geographical education is vitiated by teaching that the Earth is a planet; but it is difficult to see how the ordinary topographical and physical aspects of the Earth's surface, which are studied purely as they exist, and taught without any dependence on astronomical theories, can involve those questions as to the size and distance of the Sun in which he finds such serious difficulties.

Historical—Vespuccius. **Harrisse.**

Americus Vespuccius. A Critical and Documentary Review of Two recent English Books concerning that Navigator. By Henry Harrisse. London: B. F. Stevens, 1895. Size 9 × 6, pp. 72. *Frontispiece. Price 10s. 6d.*

The two books reviewed are Mr. C. R. Markham's 'Vespuccius' in the Hakluyt series, and Mr. Coote's reprint of an alleged voyage of Vespuccius. Mr. Harrisse sums up his criticism thus: "One of these sets forth deductions from imaginary premises; the other is a sheer imposture, dating from the beginning of the sixteenth century and now unconsciously revived."

Travels. **Archduke Franz Ferdinand.**

Tagebuch meiner Reise um die Erde. 1892–1893. Erster Band. Wien: Alfred Hölder, 1895. Size 10½ × 7½, pp. 574. *Maps and Illustrations. Presented by the Publisher.*

The Archduke Franz Ferdinand of Austria made a trip round the world in the Austrian warship *Elizabeth*, and he has now published a magnificent volume, giving an account of his experiences in the early part of the cruise. The greater part of this volume is occupied with the Archduke's visit to India, where he spent two months, visiting all the places of interest, and forming some acquaintance with the native princes as well as the British officials.

NEW MAPS.

By J. Coles, *Map Curator*, R.G.S.

EUROPE.

England and Wales. **Ordnance Survey.**

Publications issued between August 8 and September 7, 1895.

1-inch—General Maps:—

ENGLAND AND WALES:—134, engraved in outline; 254, 263, hills engraved in black or brown; (revision) 353, engraved in outline, 1*s.* each.

6-inch—County Maps:—

ENGLAND AND WALES:—**Lancashire,** 118 S.W. **Yorkshire,** 2 S.W., S.E., 5 S.E., 6 S.W., S.E., 6A S.E., 6B S.E., 7 N.W., S.W., 12 N.W., 13 N.E., S.W., S.E., 14 S.E., 16 N.W., N.E., S.W., S.E., 17 S.W., S.E., 18 N.E., S.E., 19 N.W., 23 N.E., S.W., S.E., 24 N.E., 25 N.W., N.E., 26 N.W., S.W., 27 N.W., N.E., S.W., S.E., 28 N.W., S.W., 29 N.W., N.E., S.W., 38 N.W., N.E., 39 N.E., S.E., 40 N.W., N.E., S.E., 41 N.W., S.E., 42 N.W., 43 N.W., 52 N.W., 53 N.E., S.E., 54 N.W., S.E., 55 N.W., N.E., 62 N.E., 67 N.W., 68 N.W., S.W., S.E., 72 N.W., 74 S.W., 84 N.E., 85 S.E., 101 N.E., 1*s.* each.

25-inch—Parish Maps:—

ENGLAND AND WALES:—**Cornwall,** revised, XLVI. 1 and 5. **Devonshire,** revised, CXXIII. 2, 12, 15; CXXIV. 9, 3*s.* each.

Town Plans—5-feet scale:—

London—Re-survey, II. 78, 79, 80, 88, 89, 90, 99; III. 4, 5, 6, 7, 14, 16, 17, 25, 26, 27, 36, 37, 46, 47, 48, 49, 50, 57, 59, 68, 69, 78, 79, 80, 81, 91, 96, 98, 99, 100; IV. 71, 81, 93; VI. 9, 10, 20; VII. 84, 94, 95; VIII. 1, 2, 12, 14, 31, 41; X. 7, 31, 56, 66, 67; XI. 4, 5, 10, 15, 25; XII. 13, 14; XIV. 6, 7, 16, 18, 19, 2*s.* 6*d.* each.

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Hornsey, II. **70,** 3; III. **35,** 1; **53, 4; 62,** 1, 2, 4. This district is now complete. Index, 6*d.* **Woolwich and Plumstead** (Revised), II. **10,** 3, 4, 11, 17, 18, 21; II. **14,** 1, 2, 2*s.* 6*d.* each. Index, 4*d.*

(*E. Stanford, Agent.*)

Publications issued since September 7, 1895.

6-inch—County Maps:—

ENGLAND AND WALES:—**Lancashire,** 16, 20, 32, 2*s.* 6*d.* each. **Yorkshire,** 2 N.W., 4 N.W., N.E., S.W., S.E., 5 N.W. and 2A S.W. (on one), 5 S.W., 11 N.W., N.E., S.W., 12 N.E., S.W., S.E., 14 N.W., 17 N.E., 22 N.W., N.E., S.W., S.E., 23 N.W., 24 N.W., S.W., S.E., 28 S.E., 30 S.E., 32 S.W., 36 N.W., N.E., S.W., S.E., 37 S.W., S.E., 38 S.W., S.E., 39 S.W., 41 N.E., 42 S.W., 47 S.W., 51 N.W., N.E., S.W., S.E., 52 N.E., 53 N.W., S.W., 54 N.E., S.W., 55 S.E., 56 N.E., 57 S.E., 66 N.W., N.E., S.W., S.E., 67 N.E., S.W., S.E., 68 N.E., 69 N.W., N.E., S.W., S.E., 84 N.W., S.W., 85 N.W., N.E., S.W., 100 N.W., N.E., S.W., S.E., 101 N.W., S.W., 155 S.W., 1*s.* each.

25-inch—Parish Maps:—

ENGLAND AND WALES:—**Cornwall,** XLVI. 10. **Devonshire,** CXXIII. 10, 3*s.* each.

Town Plans—5-feet scale:—

London—Re-survey, I. 77, 78, 87, 98; III. 8, 15, 28, 38, 39, 40, 56, 66, 67, 71, 76, 77, 84, 86, 87, 89, 95, 97; VI. 30, 95; VII. 1, 11, 21, 41, 51, 61, 71, 86; VIII. 35, 52; IX. 70; X. 8, 9, 10, 16, 17, 25, 26, 27, 35, 36, 39, 42, 46, 47, 49, 50, 59, 69, 70, 77, 79, 80, 89, 99; XI. 14, 20, 61, 82, 91; XII. 1, 9, 19, 28; XIV. 8, 10, 20, 26, 36, 37; XV. 1, 21, 2*s.* 6*d.* each. Index, 3*d.*

Town Plans—10-feet scale :—
Woolwich and Plumstead (revised), II. 6, 17, 23, 25, 2*s.* 6*d.* each. Index, 4*d.*
(*E. Stanford, Agent.*)

England and Wales. **Johnston**

W. & A. K. Johnston's Railway Map of England and Wales. Revised by the various companies. Also showing canals. Scale 1 : 520,000 or 8·2 stat. miles to an inch. W. & A. K. Johnston, Edinburgh and London. *Presented by the Publishers.*

This map has been specially prepared to show the railways and canals of England and Wales. Great care has evidently been taken to bring the railways up to date.

Germany. **Königl. Preuss. Landes-Aufnahme.**

Karte des Deutschen Reiches. Scale 1 : 100,000 or 1·6 stat. mile to an inch. Sheets :—143, Bremerhaven; 514, Wunsiedel; 645, Donaueschingen; 646, Überlingen; 658, Stühlingen. Herausgegeben von der Kartogr. Abtheilung der Kgl. Preuss. Landes-Aufnahme, 1895. *Price of each sheet*, 1·50 *mark.*

ASIA.

Borneo. **Molengraaff.**

Stromkarte von West Borneo. Nach den Aufnahmen der topographischen Brigade der Niederländisch-Indischen Armee 1886–1895, mit Angabe der Stationen und Routen der Niederlandischen Expedition in den Jahren 1893 und 1894, von Prof. Dr. G. A. F. Molengraaff, 1895. Scale 1 : 2,000,000 or 31·6 stat. miles to an inch. Petermann's 'Geographische Mitteilungen.' Jahrgang, 1895, Tafel 14. Justus Perthes, Gotha. *Presented by the Publisher.*

Indian Government Surveys. **Surveyor-General of India.**

India, 64 miles to an inch, April, 1895, 2 sheets.—Telegraph map of India, 32 miles to an inch, 1894, 6 sheets.—Railway map of India, 48 miles to an inch. Railway brought up to March, 1895, 4 sheets.—Indian Atlas, Quarter Sheets: 4 miles to an inch, No. 31 N.E., parts of districts Ferozepore and Ludhiana, and of Patiala, Nabha, Faridkot, and Jind (Native States), Punjab; 87 N.W., parts of districts Khari, Bahraich, Sitapur, Barabanki, and Gonda of Oudh; 87 N.E., parts of districts Gonda and Bahraich (Oudh), Basti, and Gorakhpur (N.W. Provinces); 90 N.E., parts of districts Bilaspur (Central Provinces), Korea, and Sarguja (Chota Nagpur), and Sohagpur (Rewah); 91 N.W., parts of districts Bilaspur, Balaghat, and Raipur (Central Provinces); 125, parts of districts Khasi and Jaintia Hills, Sylhet, and Cachar (Assam).—A Chart on Mercator's projection of the Tidal and Levelling Operations of the Survey of India Department, 1858–1859, showing approximate cotidal lines.—North-West Provinces and Oudh Survey, 1 inch to a mile. Sheet No. 84 (2nd edit.), districts Buduun, Bareilly, and Pilibhit, Seasons 1867 to 1871, and 1877–78.—Upper Burma Survey, 1 inch to a mile, Sheet No. 258, district Mandalay, Season 1890–91.—Bengal Survey, 1 inch to a mile, Sheet No. 292, district Darjeeling, Seasons 1861–67 and 1880–81; No. 376, district Mymensingh, Seasons 1853–56; No. 388, districts Mymensingh and Pylhet (Assam), Seasons 1854–56 and 1861–62.—Hyderabad Survey, 1 inch to a mile, Sheet No. 211, Khamamet Circar, Seasons 1827–28 and 1837–38.—Central India and Rajputana Survey, 1 inch to a mile, Sheet No. 396, parts of Bhopal (C.I. Agency), and districts Hoshangabad and Narsinghpur (Central Provinces), Seasons 1862–64 and 1871–72; No. 409, parts of districts Sangor, Narsinghpur, Central Provinces, and Native State of Bhopal (Central India Agency), Seasons 1862–64 and 1871–72; No. 480, parts of Rewah State (Central India Agency) and Mirzapur District (N.W. Provinces), Seasons 1864–65, 1881–83, and 1885–86.—South-Eastern Frontier, 1 inch to 4 miles, Sheet No. 2 S.W., parts of districts Akyab and Kyaukpyu (Lower Burma), of Pokokku (Upper Burma), and of Chittagong (Bengal), Seasons 1853–61 and 1887.—South-Eastern Frontier, 8 miles to an inch, No. 3A (2nd edit.), districts Bassein, Myaungmya, and Thongwa, and parts of Sandoway, Henzada, Tharrawaddy, and Hanthawaddy (Lower Burma), April, 1895.—Sindh Revenue Survey, 4 miles to an inch, Sheet No. 1, districts Jacobabad, Shikapur Rohri, Khairpur, and Larkhana, with additions of Railways to 1895; No. 2, districts Jacobabad, Shikapur Rohri, Khairpur,

with additions to Railways to 1895.—Survey of India Department, Chart of Triangulation of No. 18 Party (Himalaya), Scale 2 miles to 1 inch, Sheet No. 313 (Punjab), Seasons 1886-1891.—Preliminary Chart, No. 45 of the Coast Triangulation, showing the positions of Beacons and other points fixed, Scale 2 miles to an inch, Indus Delta between Karachi and Sisa Creek, Season 1893–94.—Map showing the scene of operations of the Chitral Relief Force, 24 miles to an inch, taken from the map of Afghanistan, 1889, with corrections to date, April, 1895.—Map of the North-West Provinces and Oudh, 32 miles to an inch, accompaniment to the Annual Administration Report, N.W. Provinces and Oudh, P. W. D. and R. Branch, for the year 1893-94, with additions to March, 1895.—Map of the Central Provinces, 32 miles to an inch, with additions to Railways, March, 1895.—Bombay Residency (exclusive of Sind), 32 miles to an inch, with additions to Railways up to 1894.—His Highness the Nizam's Dominions, including the assigned districts of Berar, 16 miles to an inch, with additions and corrections to April, 1892, 2 sheets. District Palamau (Bengal), 12 miles to an inch, 1893.—District Patna (Bengal), 8 miles to an inch, 1889.—District Khulna (Bengal), 8 miles to an inch, 1890.—District Noakhali (Bengal), 10 miles to an inch, 1890.—District Umballa (Punjab), 8 miles to an inch, 1895.—District Sailkot (Punjab), 8 miles to an inch, 1895.—District Muzaffargarh (Punjab), 16 miles to an inch, 1895.—District Ghazipur (N.W. Provinces and Oudh), 8 miles to an inch, 1895.—District Lohardaga (Lower Provinces, Bengal), 4 miles to an inch, March, 1895.—Madras Survey, Index to the Survey Operations in Madras, Sheets Nos. 1 and 2.—Punjab Survey, Index to the Survey Operations in the Himalayas, showing sheets published on the 2-inch and 4-inch Scale.—Index to the Standard Sheets of the Bombay Presidency, Sheets Nos. 1 and 2.—Index to the Standard Sheets of Madras, sheets Nos. 1 and 2.—Index to the Standard Sheets of H.H. the Nizam's dominions and assigned districts of Berar.—Survey of India Department, Conventional Signs to be used on Topographical Maps.—*Presented by H.M. Secretary of State for India, through India Office.*

AFRICA.

Algeria. **Service Géographique de l'Armée, Paris.**

Carte topographique de l'Algérie. Scale 1:50,000 or 1·26 inch to a stat. mile. Service géographique de l'Armée, Paris. Sheets:—No. 29, El. Milia; 30, Aïne Kechera; 47, Oued Amizour; 48, Ziama; 71, Djemila. *Price 1fr. 50c. each sheet.*

Congo State. **Du Fief.**

Carte de l'État Indépendant du Congo, dressée d'après les itineraires originaux des agents de l'État et d'autres voyageurs. Par J. du Fief, Secrétaire-général de la Société royal belge de géographie. Scale 1:2,000,000 or 31·6 stat. miles to an inch. 4 sheets. *Presented by the Author.*

This is an important map of the Congo Free State, in which all the most recent and reliable information has been embodied. All the principal routes of travellers are laid down in red, together with the dates at which their journeys were made. An enlarged map of the country lying between Stanley pool and the coast, is given, as well as other insets.

French West Africa. **Pobéguin.**

Colonie de la Côte d'Ivoire. Carte dressée par H. Pobéguin, Administrateur Colonial. Levers exécutés en 1893–1894. Scale 1:150,000 or 2·3 stat. miles to an inch. *Presented by the Ministère des Colonies, Paris.*

These are four sheets of a large-scale map, in course of publication, of the French colony of the Ivory Coast, drawn from route-surveys made by M. H. Pobéguin, the Colonial Administrator. The elevations are shown by contour-lines and shading, and the author's routes are laid down.

French West Africa. **Levasseur.**

Cartes des Régions Méridionales de la Guinée et du Soudan Français. Dressé par M. le Capitaine Levasseur, de l'Infanterie de Marine, d'aprés les travaux antérieurs et ceux de MM. Andlauer, Berge, Bourgeron, Bourgeoise, Briquelot, Bunas, Ducarre, Lecerf, Levasseur, G. Maritz, P. Maritz, Mazoyer, Meyer, Morin, Morisson, Privey, Robert, Seal, Voulet. Officiers de la Colonne expéditionnaire du Soudan, Commandée par M.

le Colonel Combes, 1894. Service géographique des Colonies, Paris. Scale 1:500,000 or 7·9 stat. miles to an inch. 2 sheets. *Presented by the Ministère des Colonies, Paris.*

The result of all the French explorations in the southern portion of French Guinea and Sudan are shown on this map. All routes are laid down, and the map shows the large amount of information which has been collected by French officers and explorers in this part of Africa. It includes the country from the west coast to 60° 40′ longitude west of Greenwich, and from latitude 8° 10′ N. to 9° 50′ N.

Madagascar. **Hansen.**

Madagascar. Carte manuscrite très détaillée reproduite en photographie, dressée à l'aide des itinéraires des voyageurs. Par J. Hansen. Cartographe du ministère des Colonies et de la Société de Geographie, de Paris, 1895. Scale 1: 750,000 or 10·8 stat. miles to an inch. *Price of complete Map in 11 sheets, 70fr.*

These are the first four sheets of a map of Madagascar which is in course of publication. The present issue includes the northern portion of the island, reaching within a short distance of the capital. The map has been compiled by Mr. Hansen from all valuable material. The routes of travellers and tracks which serve as means of communication between different places are laid down. It has been produced by a photographic process, and is thus a facsimile of Mr. Hansen's original drawing. In addition to the principal map, insets are given, on an enlarged scale, of places of importance.

Timbuktu. **Hourst and Bluzet.**

Carte de la région de Timbouctou au 1: 500,000 or 7·9 stat. miles to an inch. Dressée par M. le Lieutenant de Vaisseau Hourst, Commandant la Flottille du Niger, et M. le Lieutenant Bluzet de l'Infanterie de Marine, d'après la carte Caron et Lefort, les travaux des officiers de la Flottille, les itinéraires et renseignements des officiers de la région. Publiée par la Société de Géographie de Paris en Août, 1895, avec l'autorisation de M. le Ministre de la Marine. *Presented by M. Paul Vuillot.*

This map contains a considerable amount of new work. The position of Timbuktu has been placed farther east, and an amount of detail to the west of Timbuktu, including Lake Faguibine, is given. There are insets of the Niger in the vicinity of Timbuktu, and the environs of Gundam, and the limits of the inundations of the Niger are indicated. The map is very clearly drawn, and a full explanation is given of the symbols used, as well as a list containing the names of the officers whose surveys have been used in the compilation of the map.

AMERICA.

Argentine Republic. **Hoskold.**

Mapa topográfico de la República Argentina. Scale 1: 2,000,000 or 31·6 stat. miles to an inch. Construido sobre las datos mas recientas, y dedicado al Exmº. Gobierno de la Nacion, por H. D. Hoskold. George Philip & Son, London & Liverpool, 1895. 10 sheets. *Price* £2 10*s. Presented by Messrs. J. Philip & Son.*

This map, which consists of ten sheets, has been prepared from the maps of Mr. H. D. Hoskold, C.E. It is coloured to show the political divisions, and there are insets showing tables of heights and distances, together with sections of the principal mountain ranges and a plan of the city of Buenos Ayres. The map is very nicely drawn, and is well suited for general reference, and the scale being sufficiently large to admit of considerable detail.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published during July and August, 1895. *Presented by the Hydrographic Department, Admiralty.*

No.	Inches.	
173 m =	1·15	Gulf of Finland:—Approaches to Helsingfors and Sveaborg. 2*s.* 6*d.*
2351 m =	0·99	France, west coast:—Anse de Benodet to Chaussée de Sein. 3*s.*
773 m =	0·3	Gibraltar to Adra. 2*s.* 6*d.*
2939 m =	1·0	Corsica:—Cape Feno to Lava bay. 2*s.* 6*d.*
106 m =	1·39	Sardinia:—Palmas bay. 1*s.* 6*d.*
1083 m =	4·93	Ports and anchorages in Corsica:—Gulf of St. Florent (San Fiorenzo). 1*s.* 6*d.*

682 m = 0·98 Greece, south coast:—Gulf of Kalamata. 1*s.* 6*d.*

2437 m = 0·24 Africa, north coast:—Cape Tres Forcas to Cape Ivi. 2*s.* 6*d.*

578 m = 3·55 Canary islands:—Las Palmas bay (plan, La Luz harbour). 1*s.* 6*d.*

2144 { m' = 9·65 / m = 1·2 } Ports on the east coast of Costa Rica:—Port of Limon, Port Vargas. 1*s.* 6*d.*

2337 m = 0·5 North America, west coast:—Sitka sound (the Norfolk sound of Vancouver). 1*s.* 6*d.*

686 m = various. Anchorages on the east coast of Madagascar:—Fénérive, Foule point anchorage, St. Lucia bay (Manafiafi), Fort Dauphin anchorage (Faradifai), Ytapère bay. 1*s.* 6*d.*

692 m = 1·1 Madagascar, west coast:—St. Augustine and Tulléar bays. 1*s.* 6*d.*

702 m = 0·9 Madagascar, north-west coast:—Mahajamba bay. 1*s.* 6*d.*

563 m = 0·35 Plans in the Comoro islands:—Comoro island (Grand Comoro), Johanna island (Anjouan), Mohilla island (Mohéli). 1*s.* 6*d.*

2468 m = various. Plans of anchorages in Sumba, Timor, and adjacent islands:—Memboro road, Terong road, Lawayang road, Ilwaki road, Seba road, Batu Bau road, Karbaffo bay, Baah road. 1*s.* 6*d.*

2466 m = various. Plans of anchorages in Flores and adjacent islands:—Pamali bay, Gili Lawa bay, Molo strait and approaches, Molo strait, Bajo strait, Reo bay, Geliting road, Rium bay, Lolakota bay, Maumeri road, Kongo bay, Ipih bay, Wai Mokeh road, Sungi Menasa road, Baars or Kabia island. 1*s.* 6*d.*

2244 m = 0·97 Anamba islands (north-eastern groups). 2*s.* 6*d.*

895 m = various. Plans of anchorages in Bali, Lombok, Sumbawa, and adjacent islands;—Tejakula anchorages, Benoa channel, Chanja road, Kombal bay, Ampenan road, Bangsal Barat anchorage, Labuan Chari anchorage, Lombok bay, Labuan Tering bay, Alas strait, Piju or Peejau bay, Taliwang and Chereweh bays, Nanga Miru bay, Kilo road, Kambu road, Waworada bay, Saubi road. 1*s.* 6*d.*

2243 m = 0·5 Japan, north-west coast:—Noto peninsula. 2*s.* 6*d.*

511 m = 0·56 Russian Tartary:—Trinity bay to Eastern Bosporus, including Amur bay. 2*s.* 6*d.*

2467 m = various. Plans of anchorages on the north coast of New Guinea:—Little Geelvink bay, Dorei harbour, Wairur road, Jendee road, Andai anchorage, Wandamui road, Wendesi road, Warmafu road, Korrido anchorage, Anus anchorages, Wari bay, Awek road, Mokmer road, Serui road, Manokwar anchorage, Ansus road, Manupu anchorage, Entrance to Mamberonmo river, Matterer bay, Jamna road, Humboldt bay. 1*s.* 6*d.*

809 m = 1·71 Tasmania, south coast:—Frederick Henry and Norfolk bays. 2*s.* 6*d.*

978 m = various. Kusaie or Ualan island and anchorages:—Kusaie or Ualan island (Strong island), Coquille harbour, Chobrol harbour, Port Béraid, Port Lottin. 2*s.* 6*d.*

1158 m = 3·99 North coast of Tahiti:—Papiete pass to Papenu pass. 3*s.* 6*d.*

2867 m = various. Islands and anchorages in the North Pacific Ocean:—Fanning island, English harbour, Washington island, Christmas island, west side and entrance to the lagoon of Christmas island, Johnston (Cornwallis) island and reef, Johnston (Cornwallis) island anchorage, Palmyra island. 2*s.* 6*d.*

1128 Ports Conte and Alghero, etc.:—Plan added, Gulf of Oristano.

856 New plan, Rannon anchorage, and plan added, Rodd's anchorage.

(*J. D. Potter, Agent.*)

Charts Cancelled.

No.		Cancelled by	No.
1126	Plan of Gulf of St. Florent on this sheet.	New Chart.	
		Ports and anchorages in Corsica	1083

106 Palmas bay	New Chart. Palmas bay 106
1869 Plan of Puerto de la Luz on this sheet.	New Chart. Las Palmas Bay 578
2144 Port of Limon	New Chart. Ports on the east coast of Costa Rica 2144
2337 Sitka sound	New Chart. Sitka sound 2337
686 Fénérive, Foule point anchorage 689 St. Lucia bay, Fort Dauphin anchorage, Ytapére bay	Reproduction on new chart. Anchorages on the east coast of Madagascar 686
692 St. Augustine and Tullear bays	New Chart. St. Augustine and Tullear bays . 692
702 Majamba bay	New Chart. Mahajamba bay 702
2762 Plan of Numa Choa anchorage on this sheet.	New Chart. Plans in the Comoro islands. . . 563
895 Allas Strait.	New Chart. Plans of anchorages in Bali, Lombok, etc. 895
978 Kusaie or Ualan (Strong island). 977 Coquille harbour, Chabrot harbour, Port Bérard, Port Lottin.	New Chart. Kusaie or Ualan island and anchorages 978
1508 Plan of Rodd's anchorage on this sheet.	New plan of Rodd's anchorage on sheet 856
1382 Southern portion of this sheet.	New Chart. Papiete pass to Papenu pass . . 1158
2867 Fanning island, English harbour, Washington island. 979 Plans of Christmas island, entrance to Christmas island lagoon, and Palmyra island on this sheet.	Reproduction on New Chart. Islands and anchorages in the North Pacific Ocean 2867

Charts that have received Important Corrections.

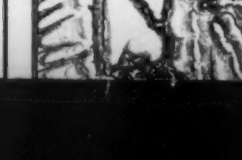
No. 1411, Wales:—New Quay to Holyhead. 1607, England, east coast:—North Foreland to the Nore. 2151, England, east coast:—River Thames, Broadness to Mucking light, etc. 1185, England, east coast:—River Thames, Sea Reach. 2554, Italy, west coast:—Leghorn (Livorno) roadstead. 2199, Gulf of St. Lawrence:—Richibucto river. 2344, Gulf of Mexico:—Mobile bay. 1544, Central America:—Panama road. 2531, North America, west coast:—Cape Mendocino to Vancouver island. 610, Africa, west coast:—River Gambia, Sheet 3. 706, Madagascar:—Pasindava and adjacent bays, etc. 827, India, west coast:—Vengurla to Cape Cormorin. 737, India, west coast:—Arnala island to Kundai. 2149, Sumatra, east coast:—Gaspar and Banka straits. 993, Japan:—Oterranai anchorage, Sutt bay, etc. 938, New Guinea:—East Cape to Cape Nelson. 939, New Guinea:—Cape Nelson to Hercules bay. 764, Pacific ocean:—New Hanover, New Britain, and New Ireland. 1380, Pacific ocean, New Caledonia, New Hebrides, and Loyalty islands.

(*J. D. Potter, agent.*)

PHOTOGRAPHS.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

MAPS TO ILLUSTR



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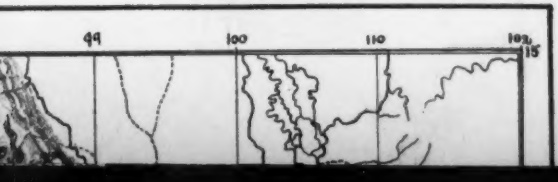
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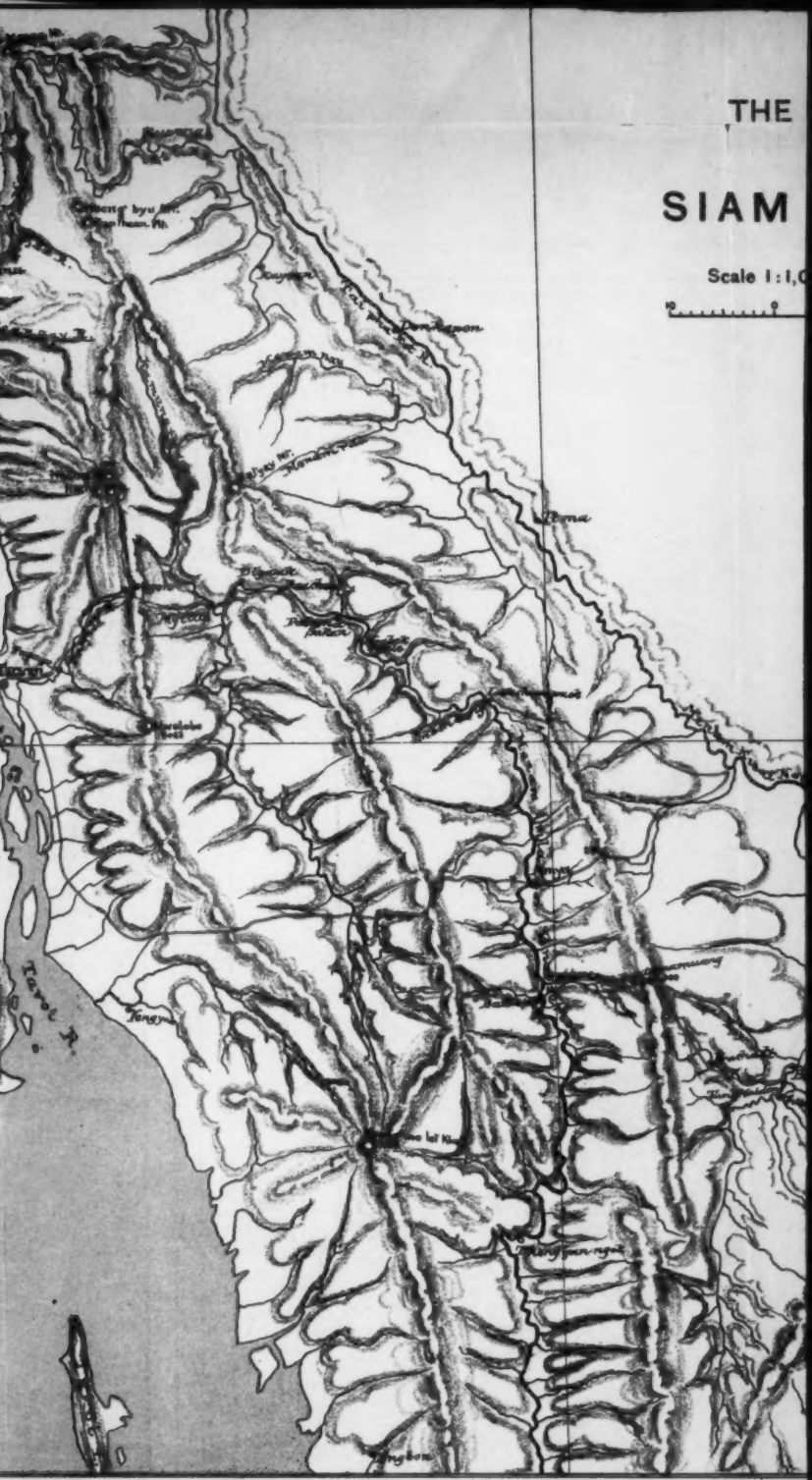

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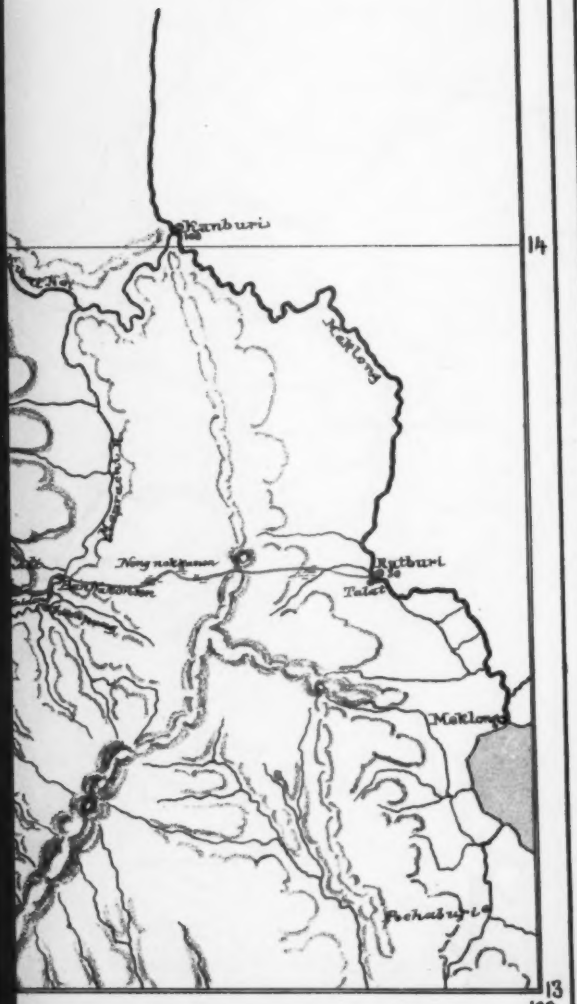

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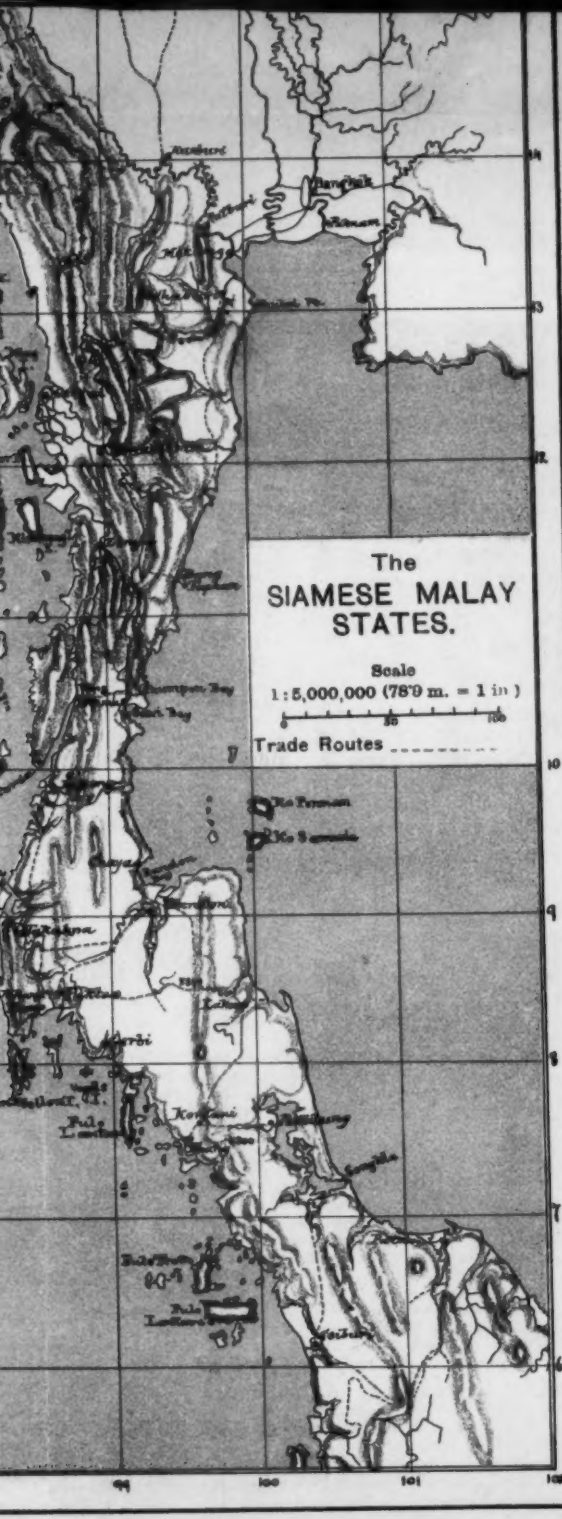
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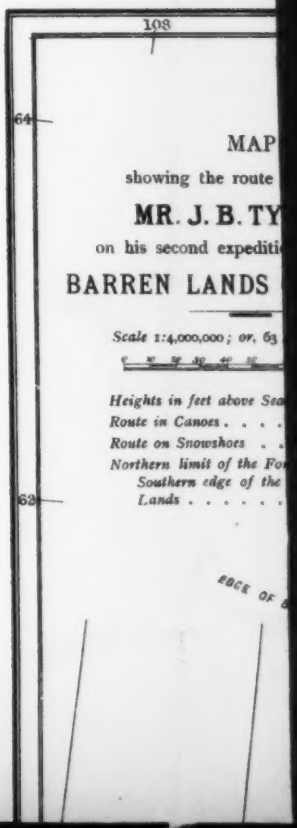
Trade Routes


108
64
MAP
showing the route
MR. J. B. TY
on his second expediti
BARREN LANDS
Scale 1:4,000,000; or, 63
Heights in feet above Sea
Route in Canoes . . . .
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Northern limit of the Fo
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Lands . . . . . .
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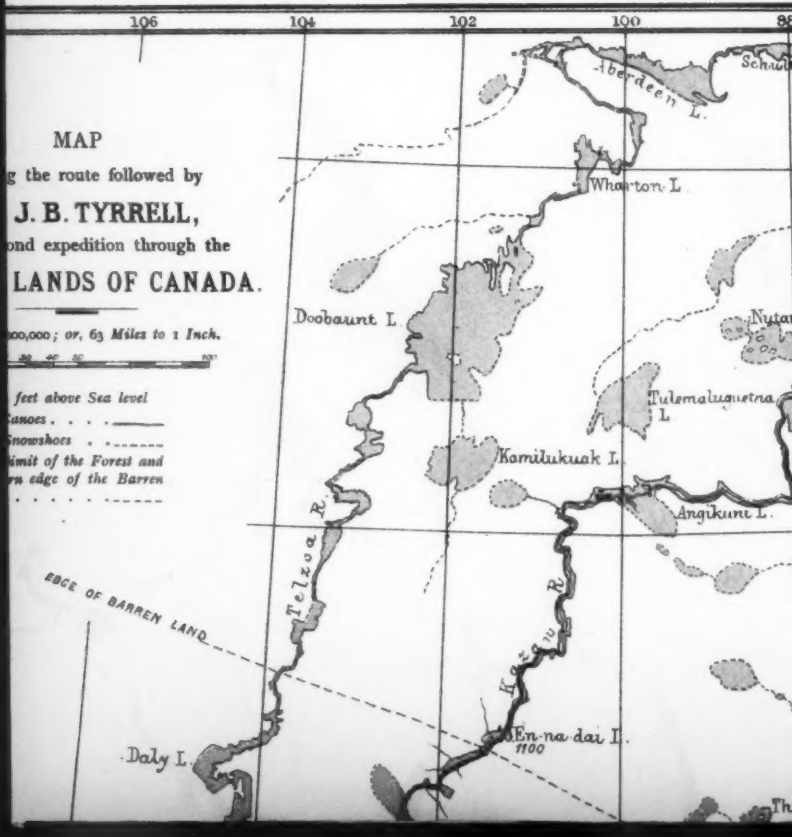
EDGE OF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MAP
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J. B. TYRRELL,
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LANDS OF CANADA.
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feet above Sea level
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Daly L.
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1100

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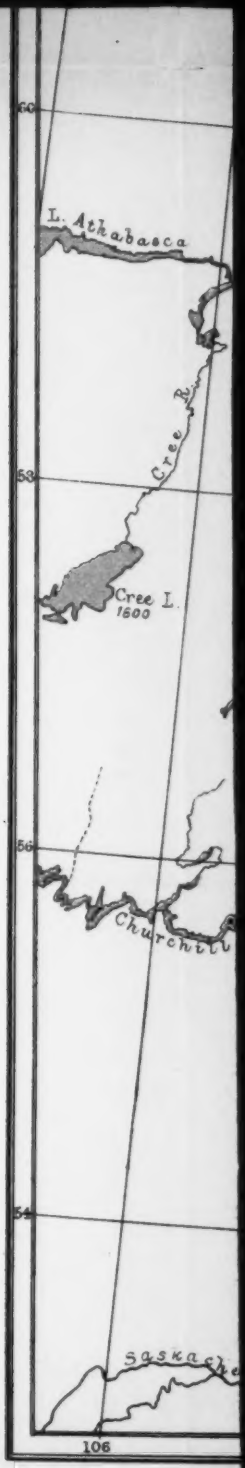
Baker L.
Chesterfield Inlet
Kazan R.
Nutarawit L.
Kaminnriak L.
Ferguson L.
Rankin Inlet
Marble I.
Fergusons R.
Walrus or Seahorse I.
Sir Bibby I.
Magpie R.
C. Eskimo
Thelinne L.
HUDSON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